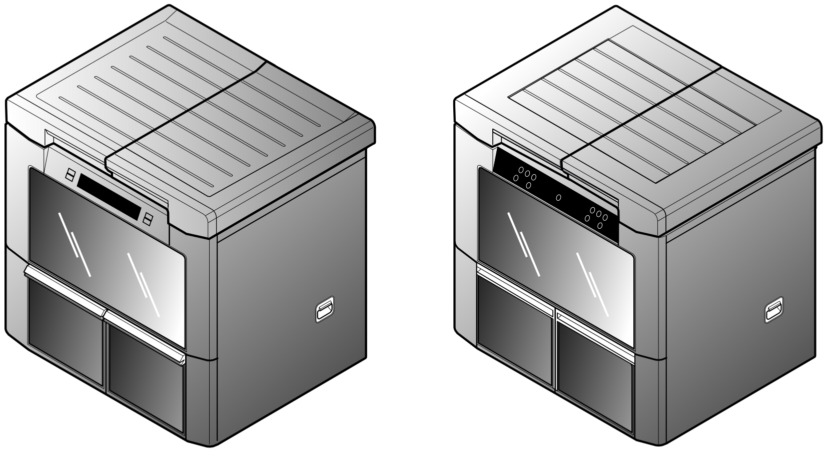
LG

http://biz.lgservice.com

KIMCHI REFRIGERATOR
SERVICE MANUAL

CAUTION
PLEASE READ CAREFULLY THE SAFETY PRECAUTIONS OF THIS MANUAL BEFORE CHECKING OR OPERATING THE REFRIGERATOR.



MODEL : GR-K24PS/GR-K243UG

Safety regulations

1. First check if there is any electric leakage in the refrigerator unit.
2. Always unplug the refrigerator before handling any electricity conducting parts.
3. When testing the refrigerator with the power on, use insulated gloves for safety.
4. When using measuring instruments, check the rated current, voltage and capacity.
5. Do not allow water or moisture to get into the mechanical or electrical parts of the refrigerator.
6. Remove all things on top of the refrigerator before tilting it during repairs to avoid spills.
   Be especially careful for thin objects (glass sheet, book).
7. When the refrigerating cycle is damaged, always request service to the major repair service agency.
   (This is to prevent the house from getting dirty from the gas within the cycle.)
8. Always double check for repairs related to safety to ensure customer safety.

Contents

Safety warnings and cautions

Chapter 1. Safety warnings and cautions

- ▶ Always observe the 'Safety Warnings' and 'Cautions', which hare intended to ensure safety while repairing or operating the product.
- ▶ Precautions are classified into 'Warning' and 'Caution', as explained below.

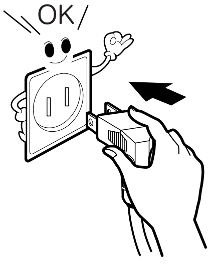
⚠ Warning Warning means a dangerous condition which could result in significant damage, injury or death if the instructions are not followed.

⚠ Caution Caution means a condition which could result in damage or injury if instructions are not followed.

⚠ Warning

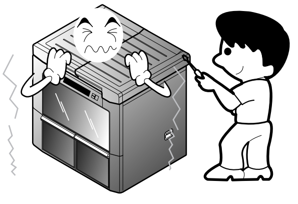
Use caution to prevent electric shock

The control panel (main PCB) uses 310V. When replacing PCB parts, wait at least 3 minutes after unplugging. Always unplug the refrigerator before repairing.



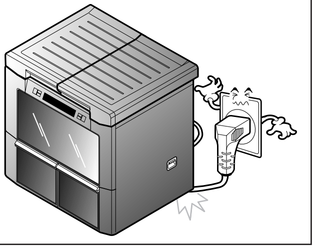
Do not allow the consumer to repair, disassemble or modify the refrigerator.

Damaged power plug can cause fire or electric shock.



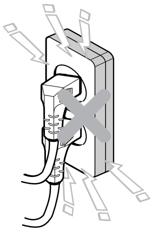
Make sure that the power plug is not pressed by the back of the refrigerator

Power plug may be damaged and cause a fire or electric shock.



Use a dedicated circuit.

Overloading circuits or outlets could cause a fire.

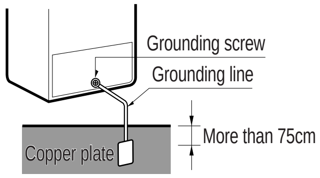


Safety warnings and cautions

⚠ Warning

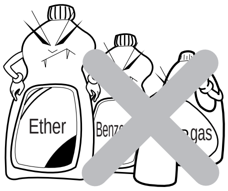
This product should always be grounded, when needed.

If you think that there is a possibility of electricity leakage by water or moisture, always ground the unit.



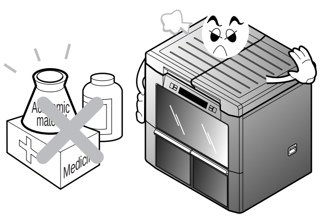
Do not store flammable liquid or gas in the refrigerator such as ether, benzene, alcohol, medicine, LP gas etc.

It can cause an explosion or a fire.



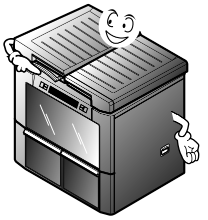
Do not store medicine or academic material etc. in the refrigerator.

Store an object that requires precise temperature control can cause deterioration in quality or unexpected reaction to cause a dangerous situation.



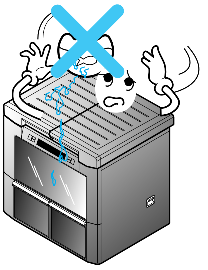
When disposing the refrigerator, remove the rubber packing on the door and do not leave it where children play.

A child can be dangerously entrapped in the refrigerator.



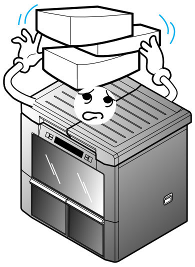
Do not set items, particularly flower vase, cup, cosmetic or medicine on top of the refrigerator.

It can cause fire and electric shock or cause an injury from dropping.



Do not stack items or carelessly store food on the refrigerator.

Items stored on the refrigerator could fall and cause injury.



Safety warnings and cautions

⚠ Caution

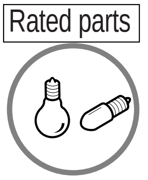
When using the refrigerator for low temperature in freezer or refrigerator, do not store bottles.

Bottles can freeze and cause the bottles to crack, which can cause an injury.



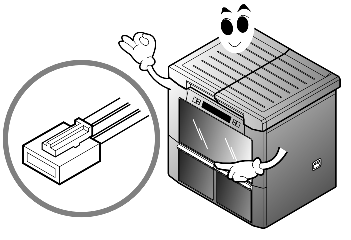
Always use exact replacement parts.

Make sure that the model name, voltage, current and temperature ratings are correct for the electric part.



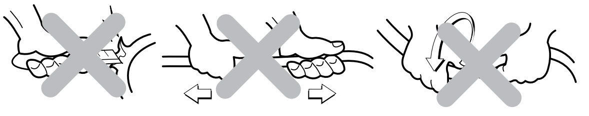
During repairs, be sure all connectors are tight and wires are properly routed.

Make sure the connectors of the housing part are properly connected.



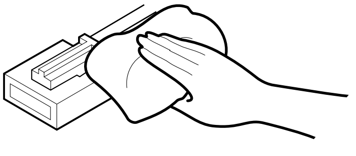
Do not bend, modify, bend, pull or twist the power cord.

It can cause fire or electric shock.



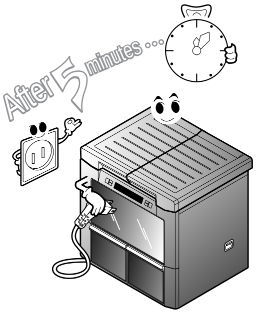
During repairs, remove all dust and foreign material from the housing part, connector part and check part.

It can prevent problems such as tracking or short circuit.



Allow at least 5 minutes for resetting if you unplug the refrigerator.

If can cause an overload to the condenser operation and cause problems.



Chapter 2. Product specification

2-1. GR-K24PS/GR-K243UG

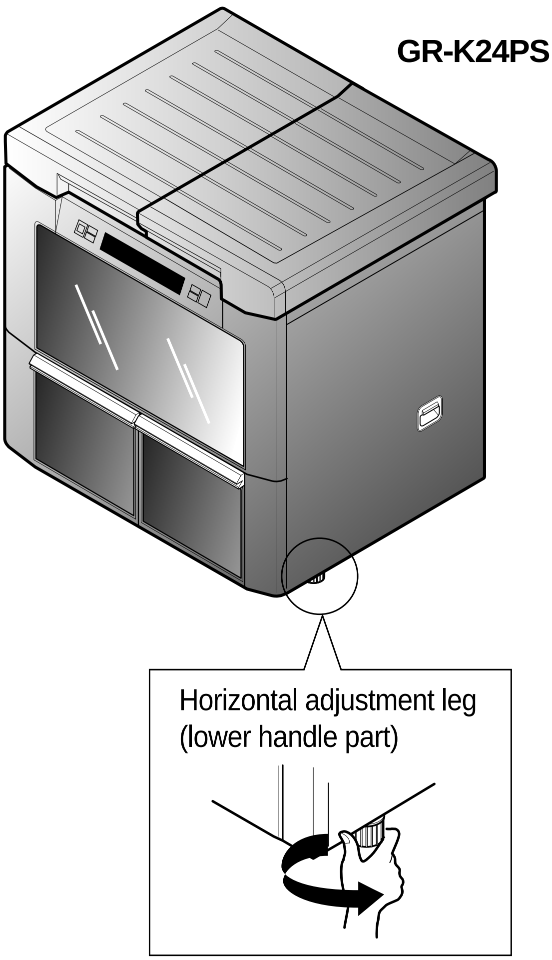
Item		GR-K24PS	GR-K243UG
Volume	Usable volume	238Li	242.6Li
	Top left compartment	92Li	94.3Li
	Top right compartment	92Li	94.3Li
	Bottom left compartment	27Li	27Li
	Bottom right compartment	27Li	27Li
External dimensions	Width	922mm	922mm
	Depth	712mm	699mm
	Height	975mm	975mm
Total weight		88kg	87kg
Motor power consumption		108W	
Cooling method		Direct cooling	
Store/Season		Electronic	
Icing removing method		Manual start, manual end	
Insulation material		CYCLO PENTANE	
Fresh vegetable basket		1pc	
Kimchi storage container		8pcs	
Drawer storage container		1pc	
Chungukjang fermenting container		1pc	
Low temperature catalytic deodorizing system		2pcs	
Freeze cycle	Compressor	MA57LAQF	
	Evaporator	PIPE ON SHEET	
	Refrigerant	R134a(165g)	
	Oil	Freol 10G (220cc)	
Electrical part rating	PTC	P6R8MA	
	Overload protection device	4TM412RFBYY	
	Fan motor for compressor cooling	ø110, 3blades attached	
	Lid left compartment Kimchi seasoning heater	115V / 80W (Resistance: 165Ω)	
	Lid right compartment Kimchi seasoning heater	115V / 80W (Resistance: 165Ω)	
	Drawer left compartment Kimchi seasoning heater	115V / 8W (Resistance: 1,653Ω)	
	Drawer left compartment Chungukjang seasoning heater	115V / 6W (Resistance: 2,204Ω)	
	Drawer right compartment rice storage heater	115V / 8W (Resistance: 1,653Ω)	
	Capacitor	CS: 160 VAC 100μF	

Product installation method

Chapter 3. Product installation method

3-1. Method to adjust height of refrigerator

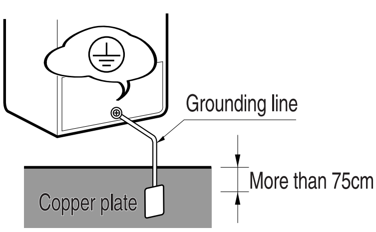
■ **First adjust the level of the refrigerator.**
(If the floor is uneven, the refrigerator may vibrate or cause noise.)



▶ Adjust the front to be leveled by turning the height adjustment screws under the front corners in the arrow direction.

3-2. Grounding method

1. In the following cases, you must always ground the refrigerator.
   1) When using the refrigerator in the 110V region
   2) When using the refrigerator in the 220V region where the power outlet is not grounded to the side.
2. You must install a circuit breaker (rated current 15mA, rated non-operating current 7.5mA) if it is difficult to ground the refrigerator. For the circuit breaker, you can purchase and use the one with plug and outlet.



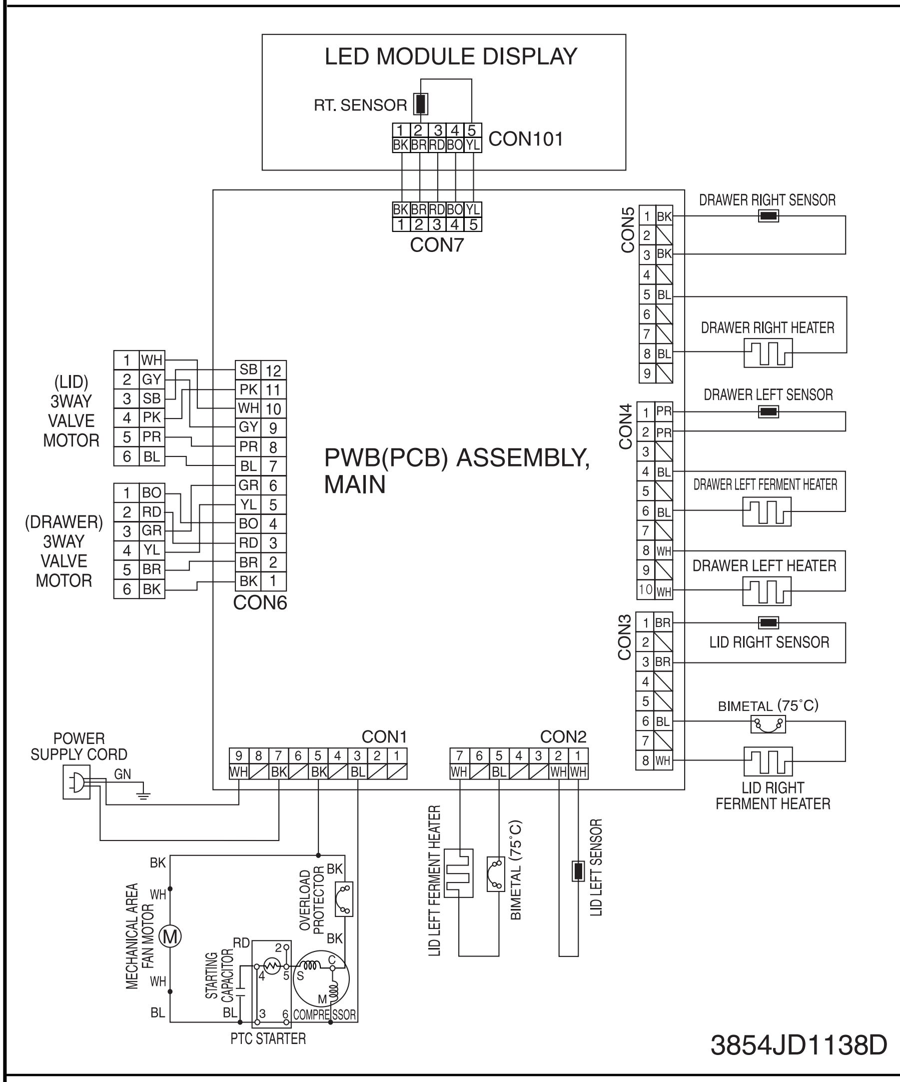
3. For the grounding connector on back of the refrigerator, use a connecting line with a diameter of 1.6mm or longer or a single core cord line with a nominal cross section area of 1.25mm or bigger. After soldering, bury the copper plate 75cm or deeper from the ground.
   ▶ Size of copper plate: Thickness (0.7mm or more), area (90cm or more)

Caution **Do not ground the circuit in one of the following places:**
1. Water pipe: If there is a plastic piping within the system, the ground may not be valid.
2. Gas pipe: There is a danger of fire or exposition.
3. Phone line or lightning rod: If lightening strikes, dangerous voltage may be induced in the circuit.

Circuit diagram

Chapter 4. Circuit diagram

CIRCUIT DIAGRAM



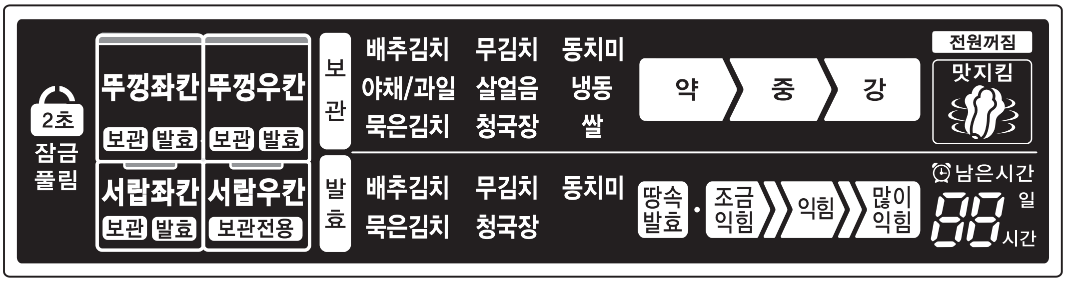
YL:YELLOW	BO:BRIGHT ORANGE	RD:RED	BL:BLUE	BN:BROWN
BK:BLACK	WH:WHITE	SB: SKY BLUE	PK:PINK	GN:GREEN

Chapter 5. MICOM function and circuit description

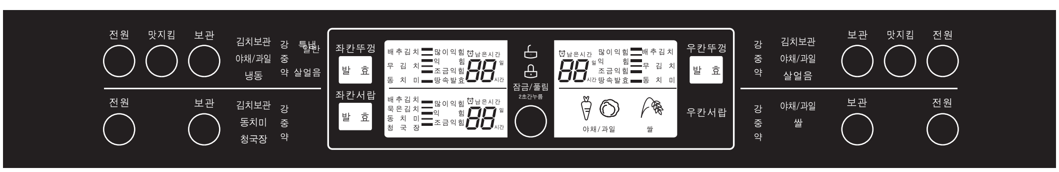
5-1. Function description

5-1-1. Display part

1) GR-K24PS



2) GR-K243UG



NOTCH	Cabbage/Radish/Mul Kimchi			Vegetable/Fruit			Light freezing			Freezing food			Rice			Chungukjang		
	Min	Mid	Max	Min	Mid	Max	Min	Mid	Max	Min	Mid	Max	Min	Mid	Max	Min	Mid	Max
Temperature	0°C	-1.0°C	-2.0°C	3.5°C	2.5°C	1.5°C	-4.0°C	-5.0°C	-6.0°C	-15°C	-18°C	-21°C	10.5°C	10°C	9.5°C	2.0°C	1.0°C	0°C

1. When the power is connected for the first time, it is set to “Lock”, “Left compartment-Cabbage Kimchi-Mid” and “Right compartment-Cabbage Kimchi-Mid”.
2. During a power shut-down or when the power is reconnected, the refrigerator maintains the prior display. But in case of a power-shut down or power reconnection during rhythm fermenting, the temperature returns to “Mid” for the applicable food type.
3. In “Lock” status, you will not hear a buzzer even when you press the buttons and the functions will not work.
   But even in the Lock status, if you press the “Compartment selection” button, it will operate in the order of “Lid left compartment” → “Lid right compartment” → “Drawer right compartment” → “Drawer left compartment” to show you the selected display.

MICOM function and circuit description

5-1-2. Food storage/seasoning function

(1) When selecting food type and storing temperature

1. Press the “Lock/Unlock” button for more than 2 seconds to switch to “Unlock” status.
2. Press the “Compartment selection” button to select the compartment to use.
3. Press the “Store” button to change the storing temperature to “Mid” → “Max” → “Min” → “Mid”. The food type changes as follows. (“Cabbage Kimchi” → “Radish Kimchi” → “Mul Kimchi” → “Vegetable/Fruit” → “Light Freeze” → “Freeze” → “Old Kimchi” → “Chungukjang” → “Rice”.) But the selected food type differs by the “Compartment selection”.
4. Press the “Lock/Unlock” button to complete the selection of food type and storing temperature. At this time, if a minute passes without pressing the “Lock/Unlock” button, it will automatically switch to Lock status and end the food type and storing temperature selection mode.

(2) When selecting food type and rhythm fermenting (seasoning)

1. Press the “Lock/Unlock” button for more than 2 seconds to switch to “Unlock” status.
2. Press the “Compartment selection” button to select the compartment to use.
3. Press the “Ferment” button to change the seasoning stage to “Seasoning” → “Seasoning+>” → “Mature seasoning” → “Underground fermenting” → “Fresh seasoning” → “Fresh seasoning+>” → “Seasoning”. The food type changes as follows as the seasoning degree changes from “Fresh seasoning+>” → “Seasoning”. (“Cabbage Kimchi” → Radish Kimchi” → Mul Kimchi” → “Old Kimchi” → ”Chungukjang”.). But the seasoning stage for old Kimchi and Chungukjang changes from “Seasoning” → “Mature seasoning” → “Fresh seasoning” → “Seasoning”, and the underground fermenting only works for the cabbage Kimchi in the lid right compartment. Also selected food type differs by the “Compartment selection”.
4. Press the “Lock/Unlock” button to complete the rhythm fermenting. At this time, if a minute passes without pressing the “Lock/Unlock” button, it will automatically switch to Lock status and end the rhythm ferment (seasoning) selection mode.
5. When the rhythm fermenting selection is completed, the remaining time is indicated and when seasoning is done, the remaining time will be “0 hours”. And the storing temperature will automatically be set to “Mid”.

(3) When selecting flavor keeping

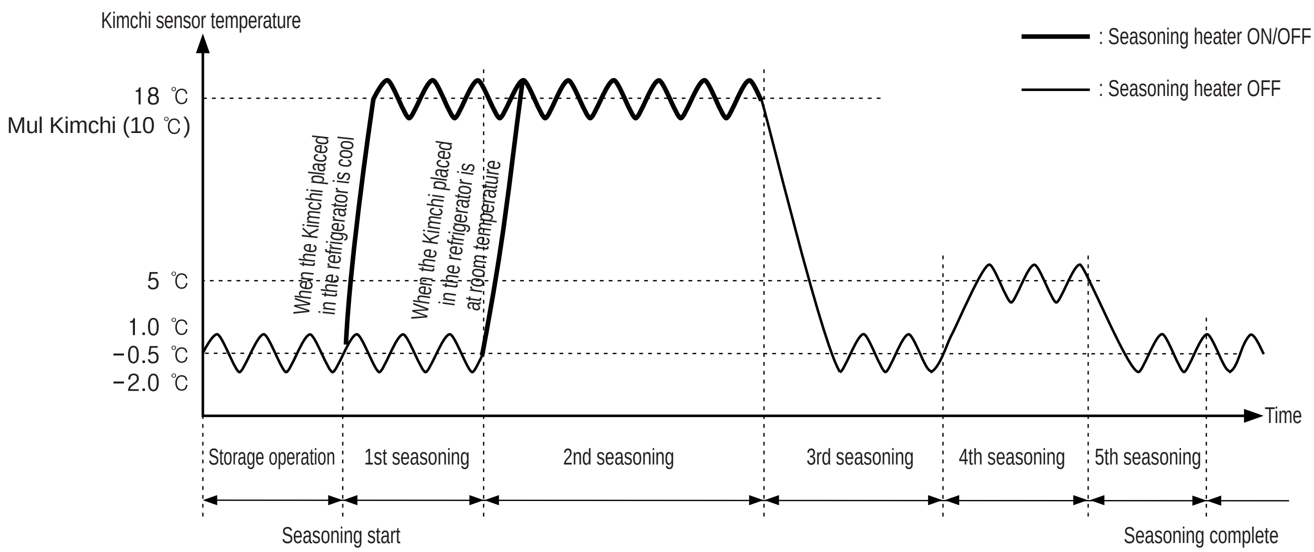
1. Press the “Lock/Unlock” button for more than 2 seconds to switch to “Unlock” status.
2. Press the “Compartment selection” button to select the compartment to use.
3. At this time, press the “Flavor keeping” button to select or cancel the flavor keeping function. (But the flavor keeping function only applies to the Cabbage Kimchi, Radish Kimchi and Mul Kimchi in the lid left and right compartment.)
4. Press the “Lock/Unlock” button to end the flavor keeping selection mode. At this time, if a minute passes without pressing the “Lock/Unlock” button, it will automatically switch to Lock status and end the flavor keeping selection mode.
5. If you select flavor keeping during seasoning process, it will immediately end the seasoning and switch to flavor keeping. At this time the storing temperature will automatically be set to “Mid”.
6. If you select the flavor keeping function, the refrigerator will lower the temperature to maintain the current Kimchi flavor. (-1 degrees for “Min”, -0.5 degrees for “Mid” and -0 degrees for “Max”.)
7. During flavor keeping operation, a cold shock operation is done every 12 hours.
8. If you select rhythm fermenting during flavor keeping, the flavor keeping function will be canceled.

MICOM function and circuit description

5-1-3. When selecting power on/off function

1. Press the “Lock/Unlock” button for more than 2 seconds to switch to “Unlock” status.
2. Press the “Compartment selection” button to select the compartment.
3. At this time, press the “Power” button for more than 2 seconds to turn the power off.
4. At this time, all the LEDs in the display will be turned off with the power off LED turning on.
5. If you press the “Power” button when the power is off, it will turn on the power and recover to “Cabbage Kimchi” and “Mid”.
6. When the power is turned off, the heater of the applicable compartment is turned off and the valve will be closed.

5-1-4. Rhythm fermenting control pattern diagram



1. The fermenting control pattern varies, depending on the temperature of the Kimchi when it is placed into the storage, the type of Kimchi being made and the degree of the seasoning selected.
2. In the 1st seasoning cycle, if the Kimchi is at room temperature, the cold control operates.
3. During the seasoning cycle, if the Kimchi is cold, the seasoning heater is turned on and if the Kimchi is warm, the seasoning heater is turned off.
4. If a failure occurs, such as a sensor error during seasoning, the storage will default to Cabbage Kimchi storage status.

MICOM function and circuit description

5-1-5. Temperature control method

1. The compressor runs or stops and the 3-way valve opens or closes depending on the temperature sensed by each sensor.
2. If the temperature in either compartment is unsatisfactory, the compressor is turned on and the 3-way value is opened to the affected compartment.
3. If the temperatures in several compartments are unsatisfactory, the compressor is turned on and runs until both compartments become satisfactory. The 3-way valve is opened and closed for each compartment until the temperature is satisfactory.
4. During the seasoning cycle, if the temperature is low, the heater is turned on and if the temperature is high, the compressor is turned on and the 3-way value is opened.

5-1-6. Buzzer sound

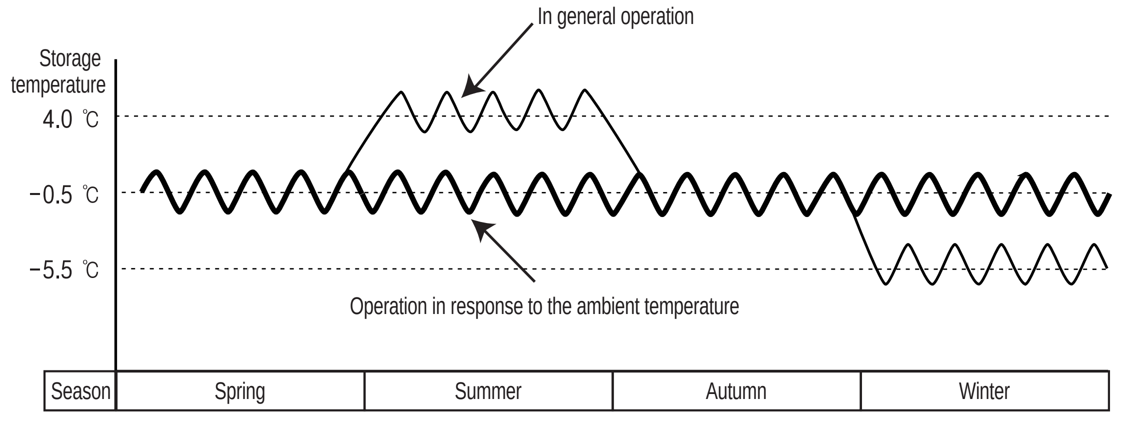
When you press a button on the front display, you will hear “ding dong” sound. (Refer to 5-2-4. (2) Buzzer operating circuit).

5-1-7 Power failure compensation function

1. When the power is restored after an outage, the refrigerator performs the setting originally programmed except for Error status and Test mode.
2. If the power fails during the seasoning process, there is not power outage compensation function and the storage defaults to previously set Kimchi type and temperature of “Mid”. (to protect excessive seasoning)

5-1-8. Operation in response to ambient temperature

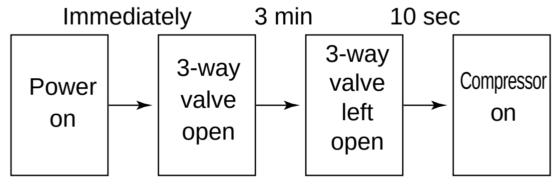
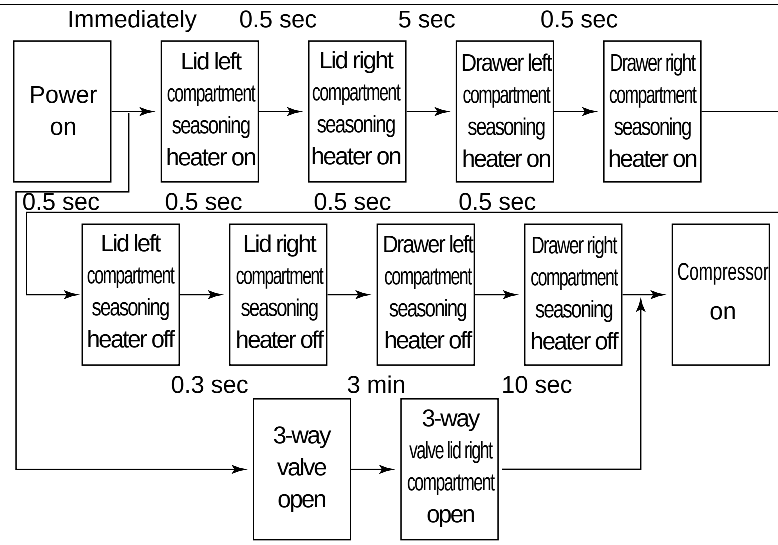
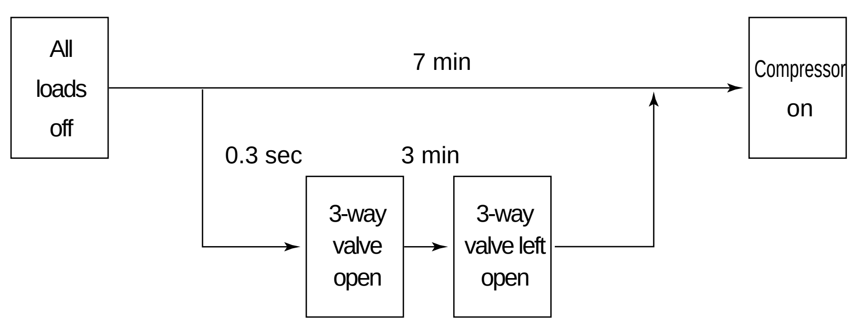
The storage senses the ambient temperature and adjusts the temperature in the compartments accordingly. This keeps the storage from being too cold or too warm because of seasonal variations and maintains exact temperatures in the compartments.



MICOM function and circuit description

5-1-9. Sequential operation of components

Components (compressor, 3-way valve, lid left compartment seasoning heater, lid right compartment seasoning heater, drawer left compartment heater and drawer right compartment heater) are operated in a specific order to prevent damage and noise caused by simultaneous operation of all parts when the unit is started and after completing the self-test routine.

<table>
<tr><th colspan="2">Operation status</th><th>Operating order</th><th>Remarks</th></tr>
<tr><td rowspan="2">Initial power-up</td><td>Temperature of the left of right sensor is >10°C</td><td>
</td><td></td></tr>
<tr><td>Temperature of the left of right sensor is <10°C</td><td>
</td><td></td></tr>
<tr><td colspan="2">When returning to normal status in test mode</td><td>
</td><td>The 3-way valve is opened to both compartments for 3 minutes; then it is opened to lid left/right compartment or drawer left/right compartment.</td></tr>
</table>

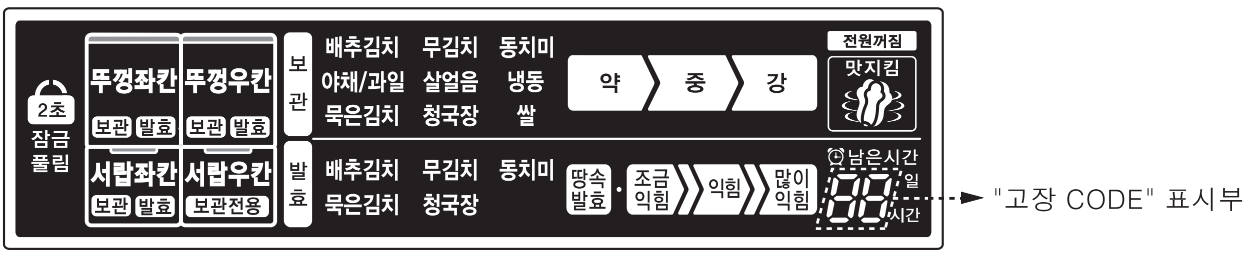
※ Operation order may slightly vary depending on temperature setting.

MICOM function and circuit description

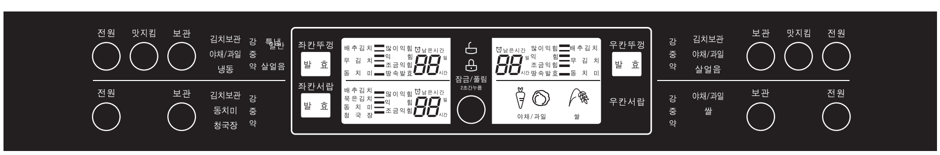
5-1-10. Error diagnosis function

1. The error diagnosis function is the function to support SVC in case of an error that can affect the performance of the product.
2. If an error occurs, the control panel button will not work.
3. If an error occurs and is resolved, the refrigerator will default to the normal status. (The unit is reset.)
4. The error codes are shown in segment for the remaining seasoning time display of the right compartment, and all LEDs, except for failure code, are turned off.

1) GR-K24PS



2) GR-K243UG



NO	Item	Error code display	Error contents	Remarks
1	Failure of lid left compartment sensor	E1	Lid left compartment sensor disconnected or short circuited	* Check the connection of each sensor
2	Failure of lid right compartment sensor	E2	Lid right compartment sensor disconnected or short circuited	
3	Failure of drawer left compartment sensor	E3	Drawer left compartment sensor disconnected or short circuited	
4	Failure of drawer right compartment sensor	E4	Drawer right compartment sensor disconnected or short circuited	
5	Failure of outside temperature sensor	Note 1)	Outside temperature sensor disconnected or short circuited	
6	Communications error	C0	When communication is not working continuously for 30 sec	The connector could be pulled out. Poor TR in communications part

Note 1) A. For display 1) ,press the “compartment selection” and “store” button simultaneously, all LED’s will turn on except the remaining fermentation time displaying LED’s.

B. For display 2) , press the left lid compartment store button and right lid compartment store button together all LED’s will turn on except right lid compartment remaining fermentation time display LED’s.

MICOM function and circuit description

5-1-11. Test function

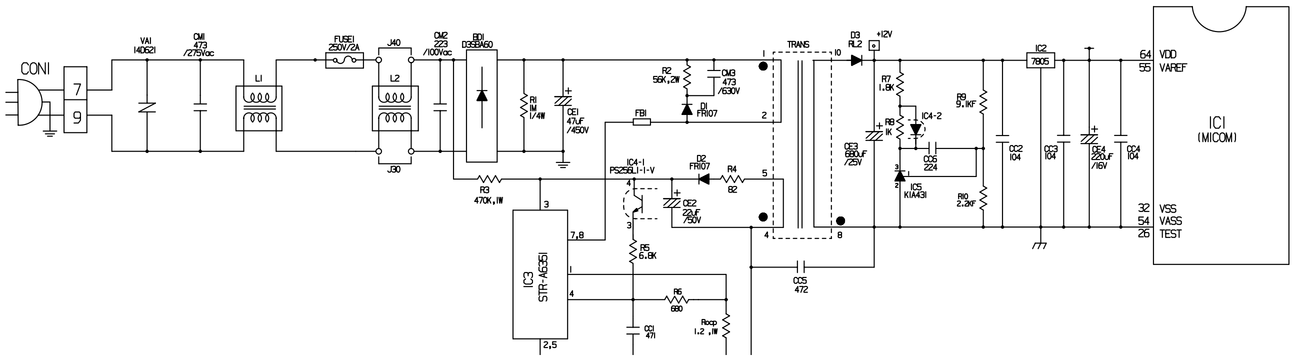
1. The test function checks the functions of the PCB and the refrigerator, searching for errors in parts.
2. The test switch on the PCB operates the test mode. The refrigerator reverts to the normal mode after 2 hours if you forget to end it manually.
3. When the test mode is active, the buttons on the control panel are disabled but the buzzer still sounds a ding if one is pressed.
4. When the test mode is completed, unplug the refrigerator briefly and plug it in again to reset it and allow normal operation.
5. If a sensor failure or other failure is detected during the test mode, release the test mode to display the failure code.
6. During the display of the error code, test mode does not work even if you press the Test switch.

Mode	Operation	Contents	Remarks
Test 1 (lid left compartment cooling power mode)	Press the test switch once	1) Compressor ON. 2) 3-way valve open 3) Heater all off 4) Display “11”	❊ The system recovers to the initial status after a maximum of 2 hours.
Test 2 (lid right compartment cooling power mode)	Press the test switch once when Test 1 indicates it is completed.	1) Compressor ON. 2) 3-way valve open 3) Heater all off 4) Display “22”	❊ The system recovers to the initial status after a maximum of 2 hours.
Test 3 (drawer left compartment cooling power mode)	Press the test switch once when Test 2 indicates it is completed.	1) Compressor ON. 2) 3-way valve open 3) Heater all off 4) Display “33”	❊ The system recovers to the initial status after a maximum of 2 hours.
Test 4 (drawer right compartment cooling power mode)	Press the test switch once when Test 3 indicates it is completed.	1) Compressor ON. 2) 3-way valve open 3) Heater all off 4) Display “44”	❊ The system recovers to the initial status after a maximum of 2 hours.
Normal recovery	Press the test switch once when Test 4 indicates it is completed.	Returns to initial status (COMP 7 min delay)	

MICOM function and circuit description

5-2. Circuit description

5-2-1. Power circuit

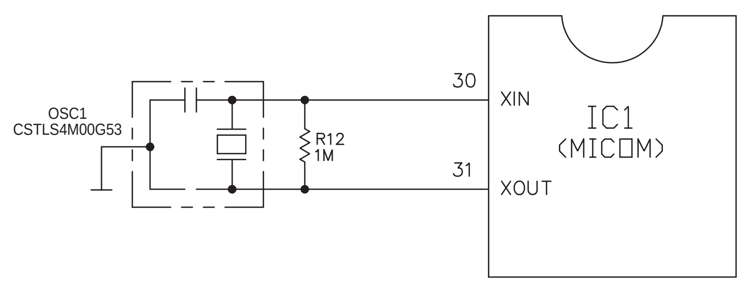


The power circuit consists of the noise attenuation part and the SMPS (Switch Mode Power Supply) part. The SMPS consists of the rectifier (BD1 & CE1) to convert AC voltage to DC voltage, switching part (IC3) to switch the converted DC voltage, transformer to transmit energy of the first side of the switching end to the second side, the secondary power to supply power to MICOM and IC, and the feedback part (IC4) to feedback the secondary voltage to the first side of the transformer in order to maintain the secondary voltage constant.

Caution : High voltage (DC 310V) is maintained in this circuit. Wait at least 3 minutes after unplugging to allow the current to dissipate. There is a danger of electric shock.

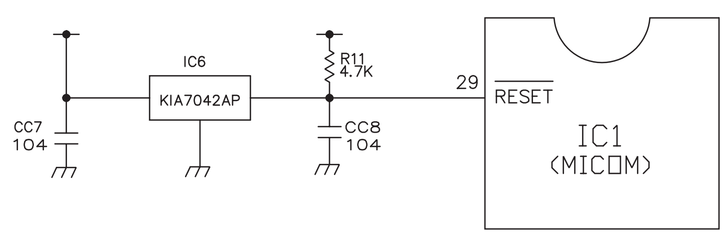
5-2-2. Oscillation circuit

The oscillation circuit provides the clock signal for synchronization and calculation of time in relation to the logic elements of microprocessor IC1 (MICOM). OSC1 must always use the original rated parts, because if the specification changes, the timing generated will not be correct, causing erratic functioning of the microprocessor.



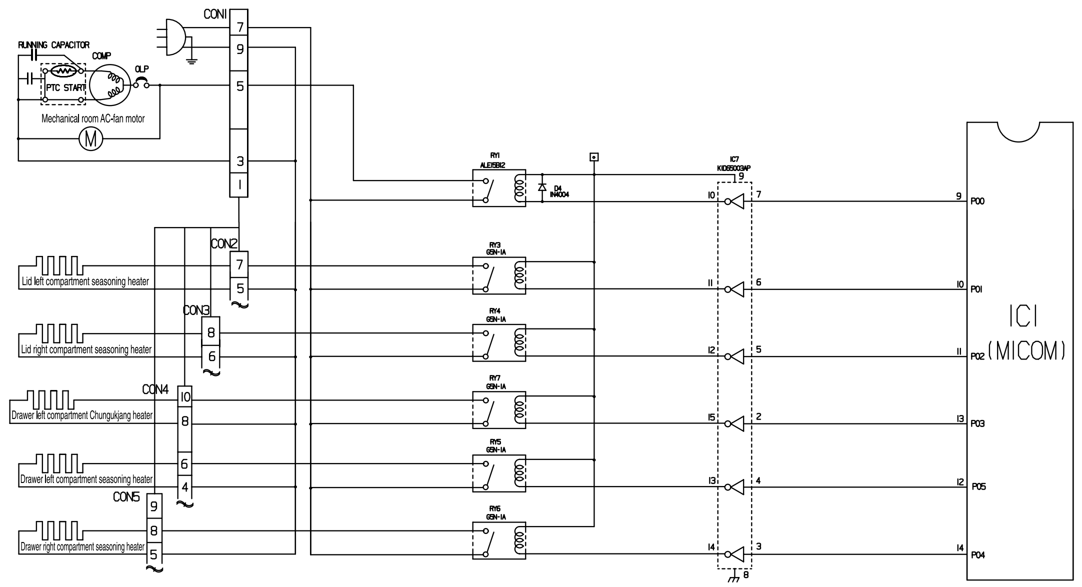
5-2-3. Reset circuit

The reset circuit allows the entire process to be started from the initial status by resetting the various elements within the MICOM (IC1), such as RAM, whenever power is applied to the unit. Low voltage is applied to the reset terminal for 10ms at the beginning of the power input. The reset terminal has a voltage of 5 V during general operation. (If the reset operation fails, the microprocessor will not operate.)



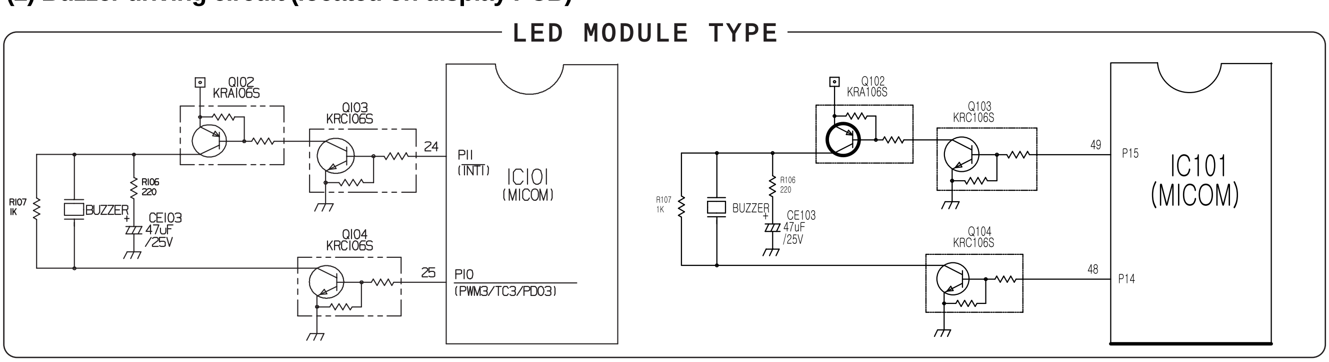
5-2-4. Load/Buzzer driving circuit

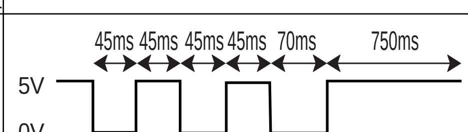
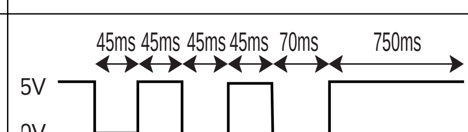
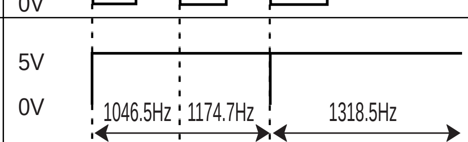
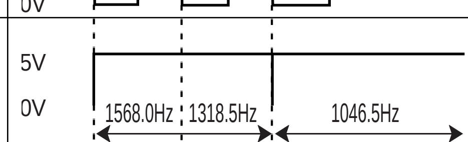
(1) Load driving circuit



Type of load		COMP. fan motor	Lid left compartment seasoning heater	Lid right compartment seasoning heater	Drawer left compartment seasoning heater	Drawer right compartment rice heater	Drawer left compartment Chungukjang heater
Measuring point(IC7)		10	11	12	13	14	15
Status	ON	Within 1V					
	OFF	12~13V					

(2) Buzzer driving circuit (located on display PCB)

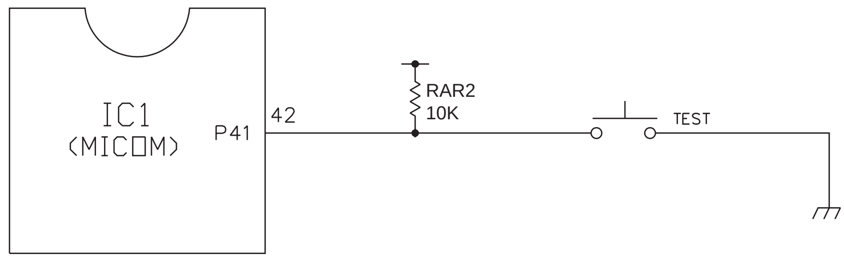


Status / Measuring point	"Ding-Dong" sound(Ding-)(Dong-)	"Ding" sound(Ding-)	Off
IC101 (Pin 3/61)			5V
IC101 (Pin 2/62)			0V

MICOM function and circuit description

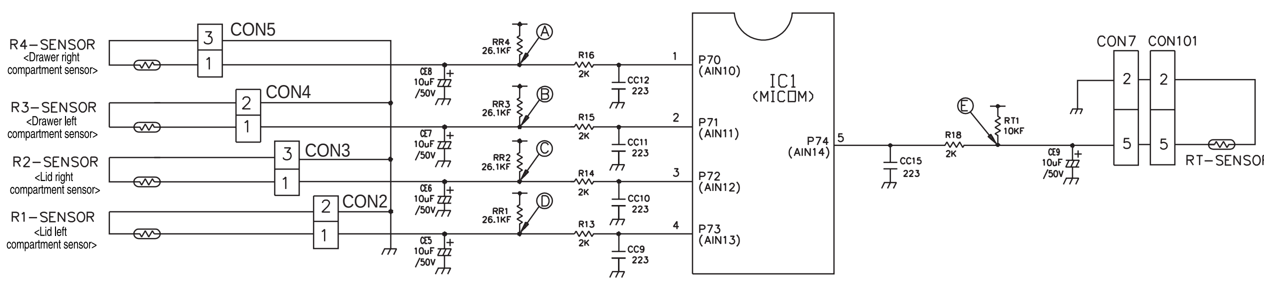
5-2-5. Switch input circuit

The following circuit is the input circuit to detect the test switch signal to check the refrigerator.



5-2-6. Temperature sensor circuit

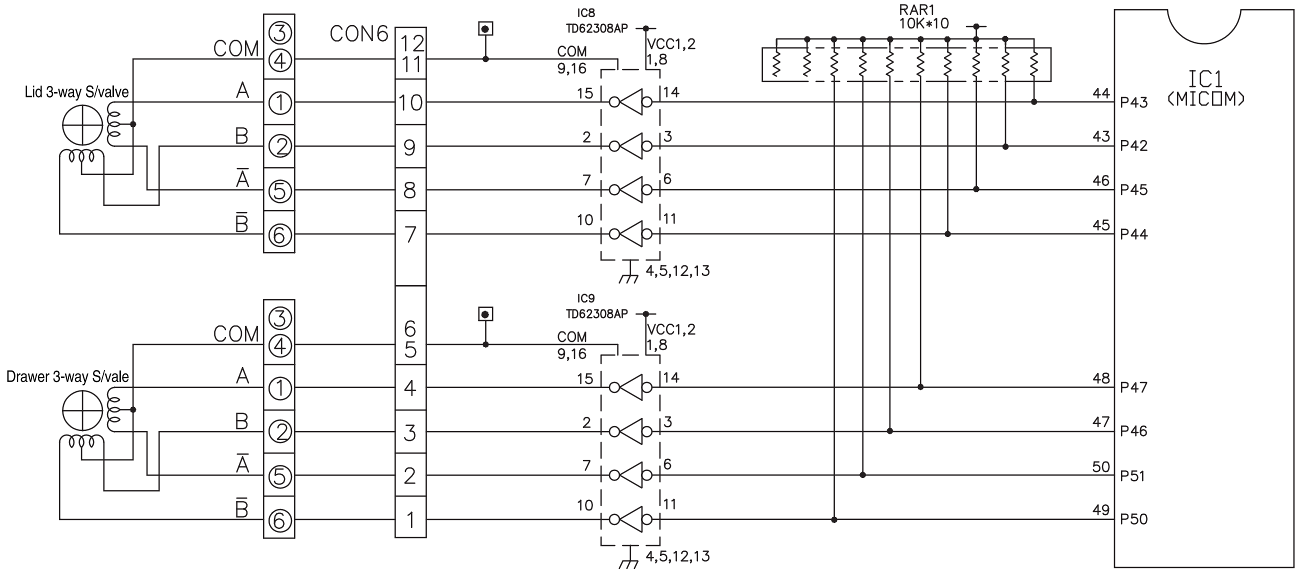
The following temperature sensor circuit consists of a sensor to detect the outside (ambient) temperature, sensors in the lid left and right compartment, sensor in the drawer left and right compartment for storing and seasoning Kimchi. The status of each sensor, whether open or shorted, is shown below.



Sensor	Check point	Normal(-30℃~50℃)	Shorted	Open
Drawer right compartment sensor	POINT Ⓐ Voltage	0.5V~4.5V	0V	5V
Drawer left compartment sensor	POINT Ⓑ Voltage			
Lid right compartment sensor	POINT Ⓒ Voltage			
Lid left compartment sensor	POINT Ⓓ Voltage			
Outside sensor	POINT Ⓔ Voltage			

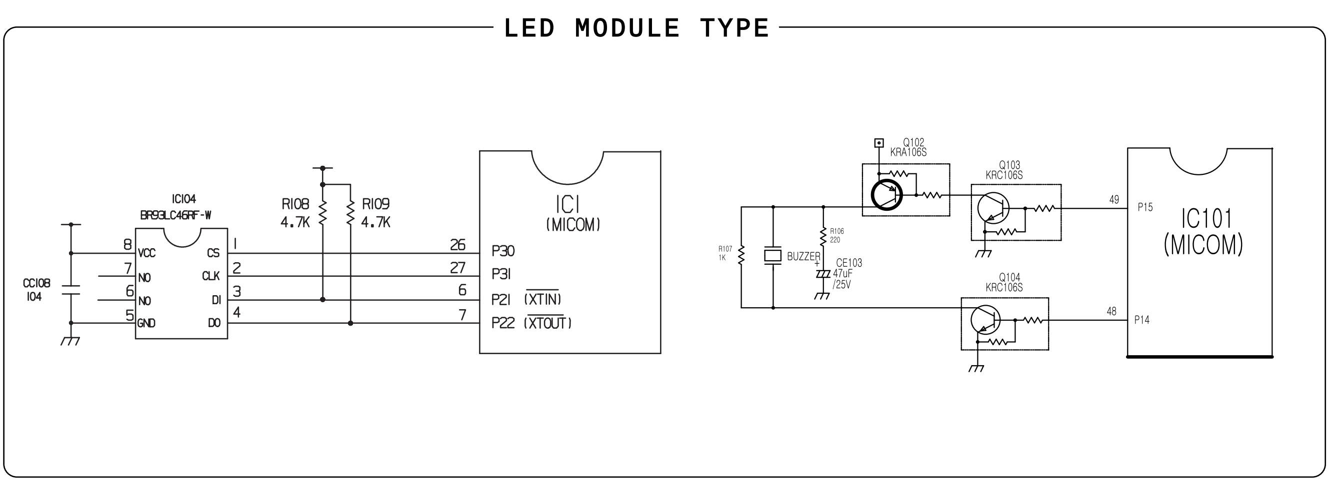
MICOM function and circuit description

5-2-7. Stepping motor operation circuit (3-way valve)



▶ The motor is operated by sending out “High” and “Low” signals as many as the designated number of steps through MICOM Pin 44, 43, 46, 45 (lid part) and 48, 47, 50, 49 (drawer part) to rotate the motor through the magnetic field formed by the motor and the coil wrapped around each stator.

5-2-8. Power failure compensation circuit (located on display PCB)

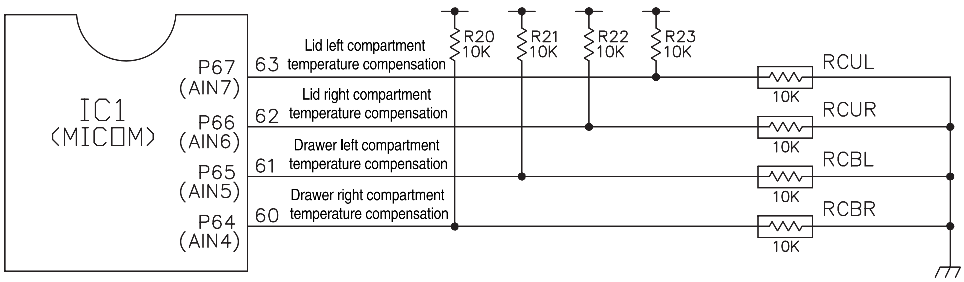


▶The power failure compensation circuit recalls the temperature range of the right and left compartment for lid and drawer, and maintains these levels if power if interrupted briefly.
The IC for power failure compensation (EEPROM) delivers to and maintains the information in MICOM through the serial interface.

MICOM function and circuit description

5-2-9. Storing temperature compensation and over-cool/under-cool cut compensation circuit

(1) Storing temperature compensation



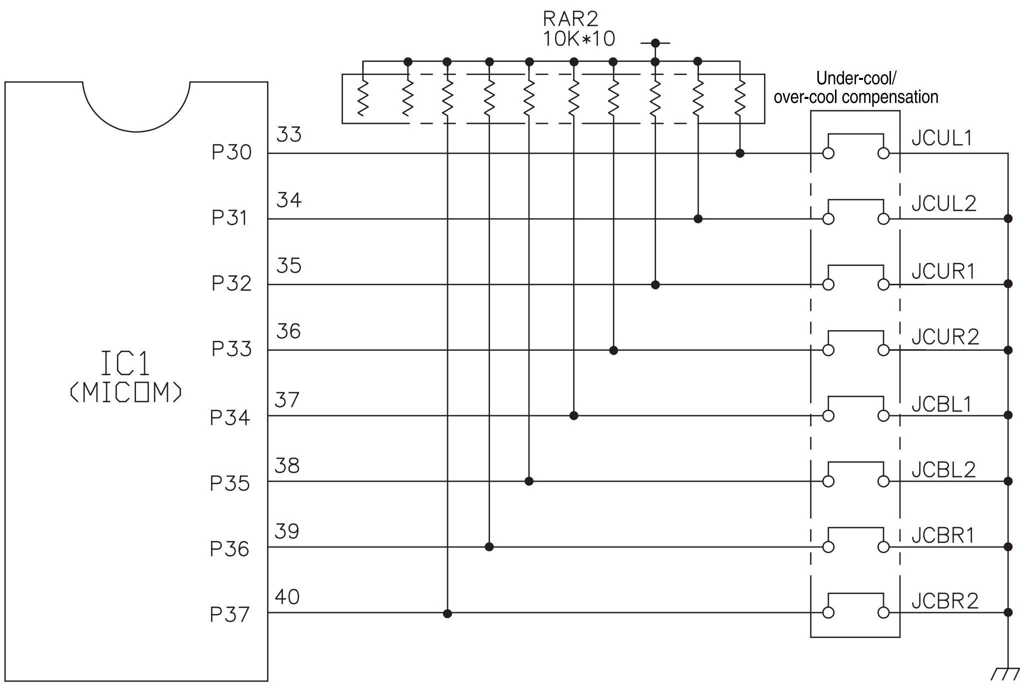
▶ This is the circuit to input the temperature compensation level required for adjusting storage temperature at the left or right compartment of the lid or drawer.

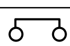
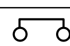
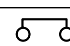
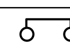
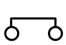
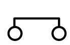
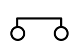
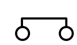
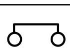
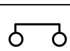
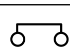
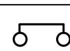
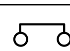
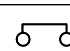
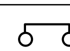
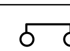
Lid left compartment (RCUL)	Lid right compartment (RCUR)	Drawer left compartment (RCBL)	Drawer right compartment (RCBR)	Temperature compensation value	Remarks
180 KΩ				+2.5 ˚C	Warmer
56 KΩ				+2.0 ˚C	↑
33 KΩ				+1.5 ˚C	↑
18 KΩ				+1.0 ˚C	↑
12 KΩ				+0.5 ˚C	↑
10 KΩ				0 ˚C	Standard temperature
8.2 KΩ				-0.5 ˚C	↓
5.6 KΩ				-1.0 ˚C	↓
3.3 KΩ				-1.5 ˚C	↓
2 KΩ				-2.0 ˚C	Cooler
470 Ω				-2.5 ˚C	

▶ Temperature compensation table by adjustment of resistance value (difference against current temperature)
Ex) If you change the resistance of compensation at the lid left compartment (RCL) from 10KΩ (current resistance) to 18KΩ (adjusted resistance), the storage temperature in the lid left compartment will be increased by 1°C .

Classification	Modified resistance / Current resistance	470 Ω	2 KΩ	3.3 KΩ	5.6 KΩ	8.2 KΩ	10 KΩ	12 KΩ	18 KΩ	33 KΩ	56 KΩ	180 KΩ
Lid left compartment (RCUL)	470KΩ	No change	0.5°C UP	1°C UP	1.5°C UP	2°C UP	2.5°C UP	3°C UP	3.5°C UP	4°C UP	4.5°C UP	5°C UP
	2 KΩ	0.5°C DOWN	No change	0.5°C UP	1°C UP	1.5°C UP	2°C UP	2.5°C UP	3°C UP	3.5°C UP	4°C UP	4.5°C UP
Lid right compartment (RCUR)	3.3 KΩ	1°C DOWN	0.5°C DOWN	No change	0.5°C UP	1°C UP	1.5°C UP	2°C UP	2.5°C UP	3°C UP	3.5°C UP	4°C UP
	5.6 KΩ	1.5°C DOWN	1°C DOWN	0.5°C DOWN	No change	0.5°C UP	1°C UP	1.5°C UP	2°C UP	2.5°C UP	3°C UP	3.5°C UP
	8.2 KΩ	2°C DOWN	1.5°C DOWN	1°C DOWN	0.5°C DOWN	No change	0.5°C UP	1°C UP	1.5°C UP	2°C UP	2.5°C UP	3°C UP
Drawer left compartment (RCBL)	10 KΩ	2.5°C DOWN	2°C DOWN	1.5°C DOWN	1°C DOWN	0.5°C DOWN	No change	0.5°C UP	1°C UP	1.5°C UP	2°C UP	2.5°C UP
	12 KΩ	3°C DOWN	2.5°C DOWN	2°C DOWN	1.5°C DOWN	1°C DOWN	0.5°C DOWN	No change	0.5°C UP	1°C UP	1.5°C UP	2°C UP
Drawer right compartment (RCBR)	18 KΩ	3.5°C DOWN	3°C DOWN	2.5°C DOWN	2°C DOWN	1.5°C DOWN	1°C DOWN	0.5°C DOWN	No change	0.5°C UP	1°C UP	1.5°C UP
	33 KΩ	4°C DOWN	3.5°C DOWN	3°C DOWN	2.5°C DOWN	2°C DOWN	1.5°C DOWN	1°C DOWN	0.5°C DOWN	No change	0.5°C UP	1°C UP
	56 KΩ	4.5°C DOWN	4°C DOWN	3.5°C DOWN	3°C DOWN	2.5°C DOWN	2°C DOWN	1.5°C DOWN	1°C DOWN	0.5°C DOWN	No change	0.5°C UP
	180 KΩ	5°C DOWN	4.5°C DOWN	4°C DOWN	3.5°C DOWN	3°C DOWN	2.5°C DOWN	2°C DOWN	1.5°C DOWN	1°C DOWN	0.5°C DOWN	No change

(2) Over-cool/Under-cool cut compensation



Lid left compartment cut compensation		Lid left compartment storing temperature compensation	Lid right compartment cut compensation		Lid right compartment storing temperature compensation	Drawer left compartment cut compensation		Drawer left compartment storing temperature compensation	Drawer left compartment storing temperature compensation		Drawer right compartment storing temperature compensation
Over-cool compensation	Under-cool compensation		Over-cool compensation	Under-cool compensation		Over-cool compensation	Under-cool compensation		Over-cool compensation	Under-cool compensation	
JCUL1	JCUL2		JCUR1	JCUR2		JCBL1	JCBL2		JCBR1	JCBR2	
CUT		+1°C	CUT		+1°C	CUT		+1°C	CUT		+1°C
	CUT	-1°C		CUT	-1°C		CUT	-1°C		CUT	-1°C
CUT	CUT	0°C	CUT	CUT	0°C	CUT	CUT	0°C	CUT	CUT	0°C
		0¡ (Factory default)			0¡ (Factory default)			0¡ (Factory default)			0¡ (Factory default)

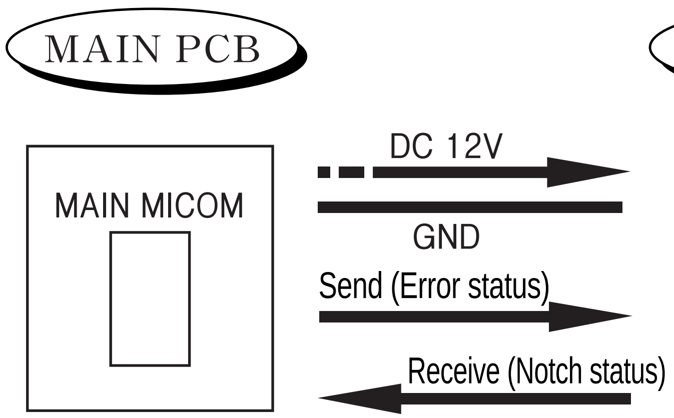
▶ The cut compensation circuit compensates the storing temperature of the left or right compartment of the lid or drawer by simply cutting it out of service for a brief period.

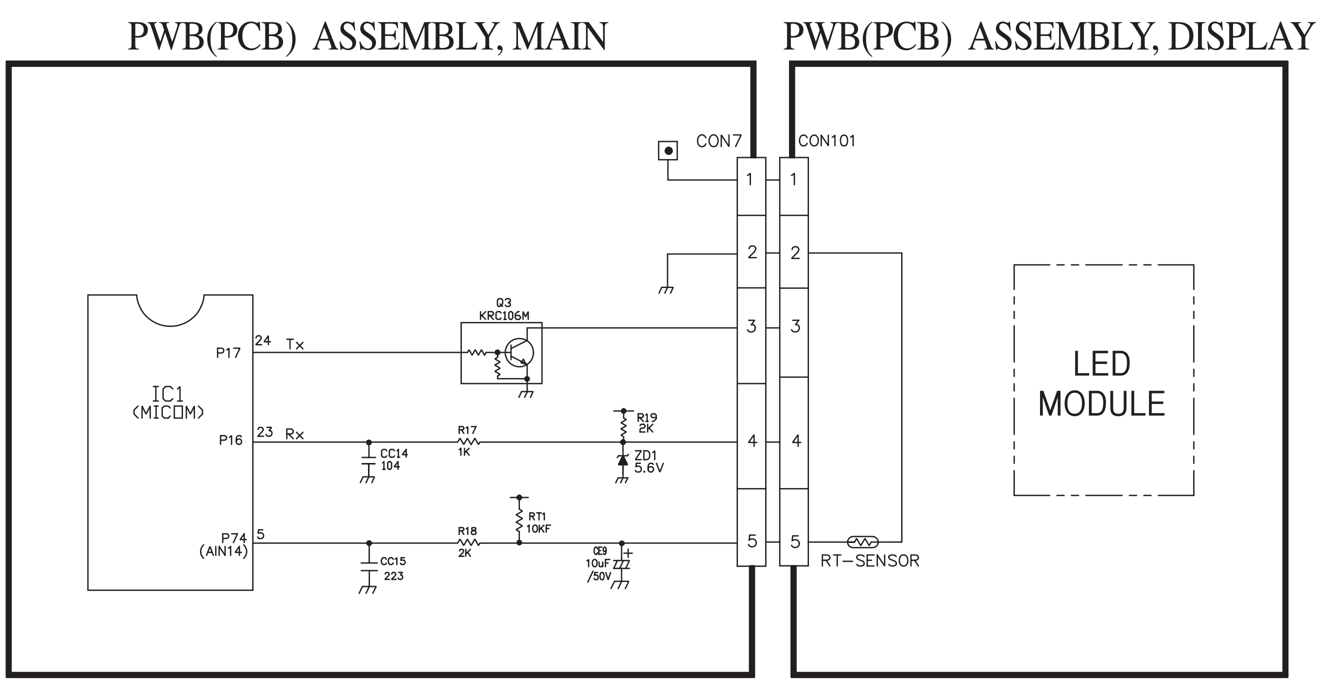
MICOM function and circuit description

5-2-10. Communication circuit between main PCB and display PCB

This circuit provides communications between the MICOM on the main PCB and the MICOM of the display PCB.

If there is no communication between these boards for 30 seconds, a communication error occurs.

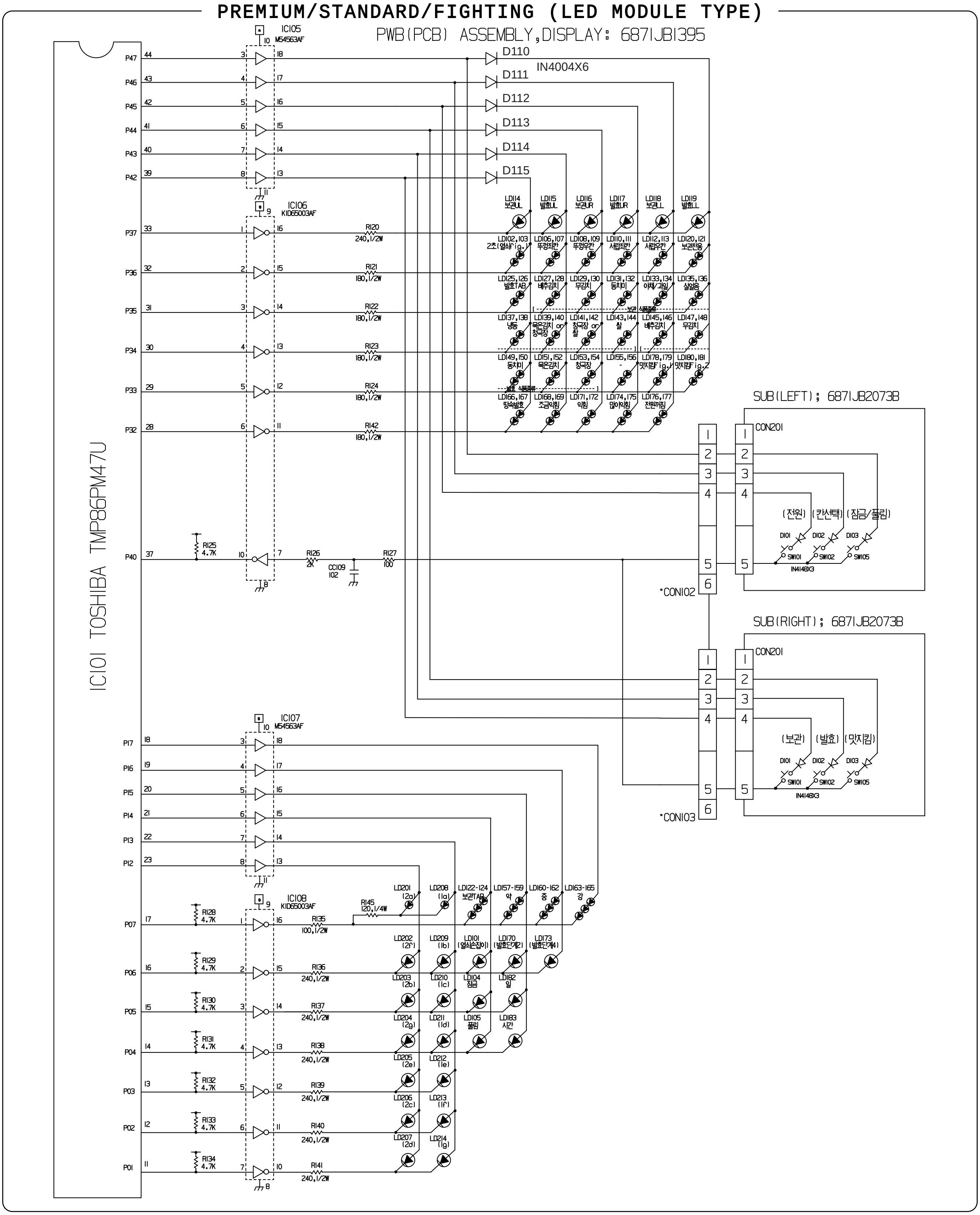




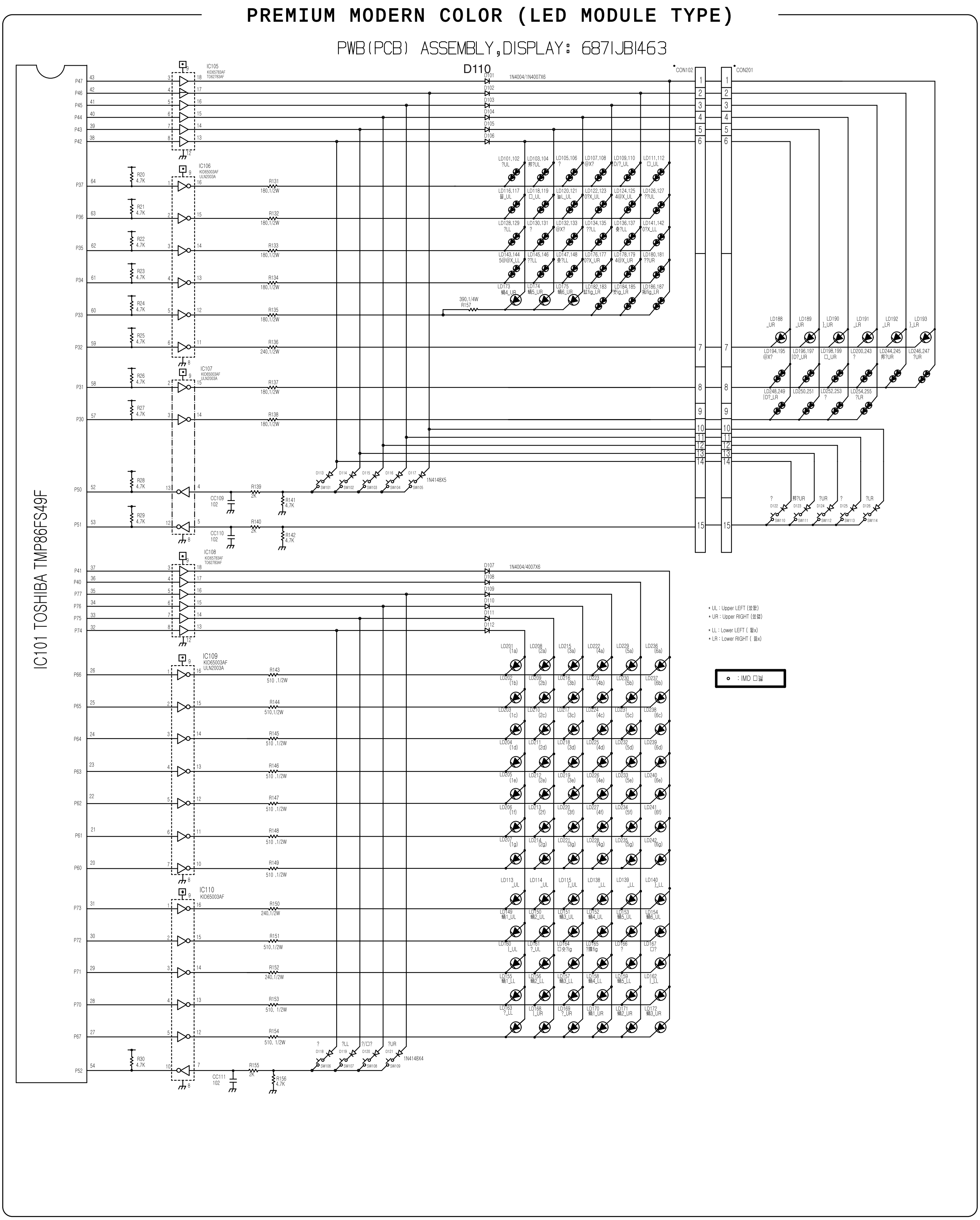
MICOM function and circuit description

5-2-11. Button input and display part illumination circuit

This circuit determines which buttons are pressed and drives the LED display, whose driving method is a scan method.



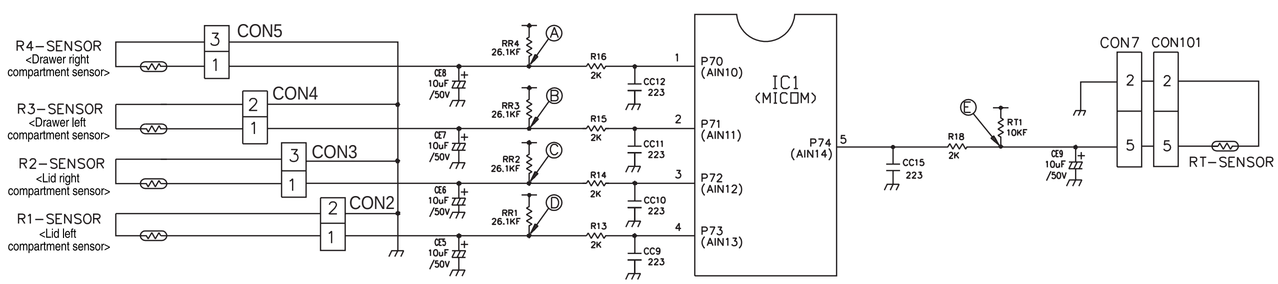
MICOM function and circuit description



MICOM function and circuit description

5-3. Sensor resistance characteristics table

Measuring temperature (°C)	Lid left compartment, lid right compartment, drawer left compartment, drawer right compartment, outside sensor
-20°C	77 KΩ
-15°C	60 KΩ
-10°C	47.3 KΩ
-5°C	38.4 KΩ
0°C	30 KΩ
+5°C	24.1 KΩ
+10°C	19.5 KΩ
+15°C	15.9 KΩ
+20°C	13 KΩ
+25°C	11 KΩ
+30°C	8.9 KΩ
+40°C	6.2 KΩ
+50°C	4.3 KΩ



▶ The tolerance of the sensor resistance is °±3%.

▶ Measure the resistance value of the sensor after leaving it for more than 3 minutes (delay is required due to sensing speed.)

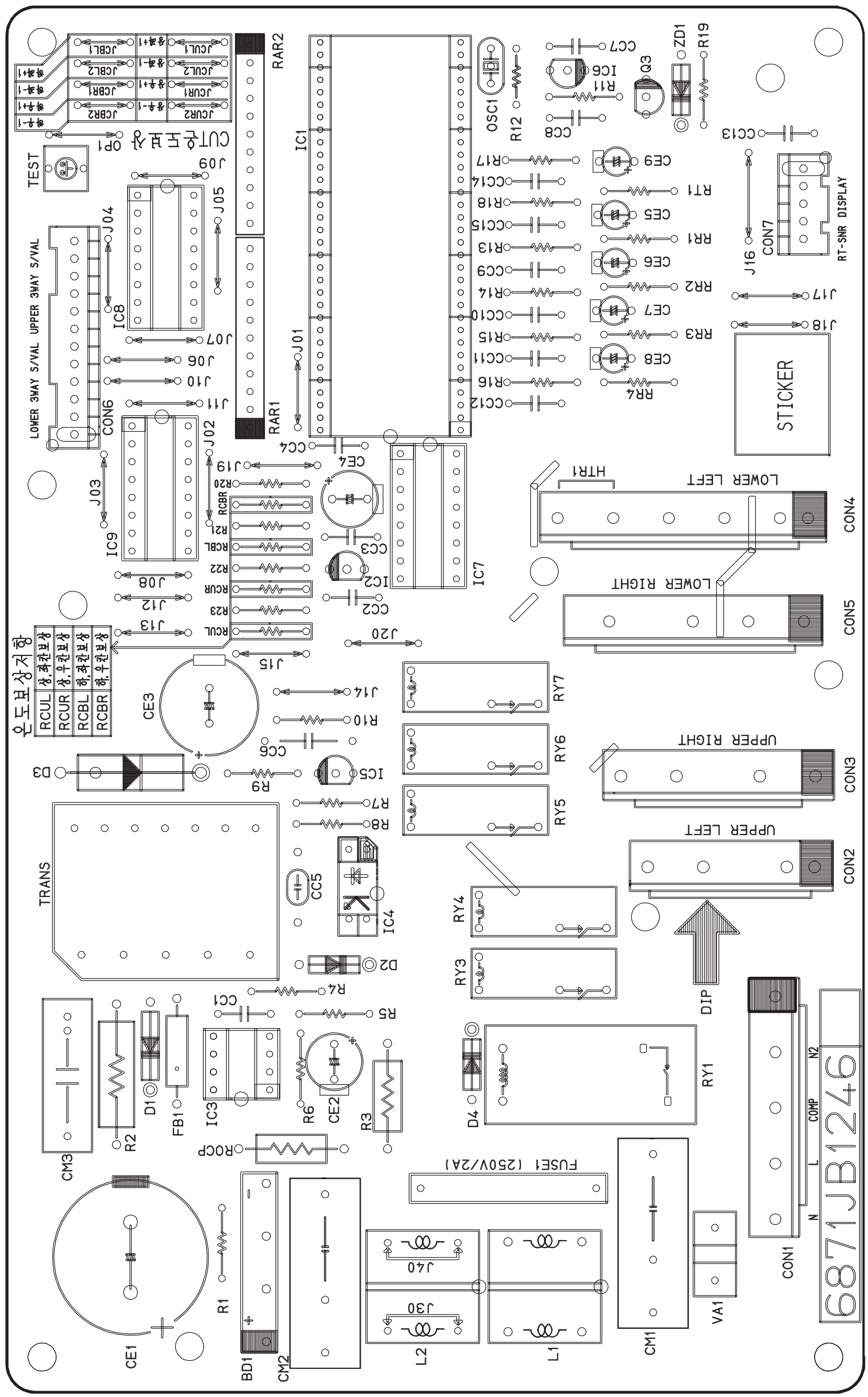
▶ Always use a digital tester. Analog testers have a higher margin of error.

▶ For left and right sensor of lid and drawer, measure both sensor ends of the connector after separating the connectors of CON 2, 3, 4, 5, CON101 of PWB (PCB) assembly and main part. For the outside sensor, measure end of 2 and 5 of CON101.

MICOM function and circuit description

5-4. PCB parts diagram and parts list

5-4-1. PWB (PCB) assembly and main parts diagram



5-4-2. PWB (PCB) assembly and main parts list

※ The parts list can slightly change according to the situation.

G	WORK					
ATHENA1-PJT	APPLICATION					
Qty	No	P/NO	DESCRIPTION	SPEC	MAKER	REMARK
1	1	6870JB8106B	PWB(PCB)	HK-PJT MAIN PCB	DOOSAN	FR1,1.6T
1	2	6170JB2010A	TRANSFORMER,SMPS[COIL	A3-PJT 12.5V 1A	한영전자	TRANS
1	3	6630AQ9106D	CONNECTOR (CIRC),WAFE	YW396-09AV	YEON HO	CON1
1	4	6630VM04107	CONNECTOR (CIRC),WAFE	YW396-07AV(7P-1,2,5,7)	YEON HO	CON2
1	5	6630VM04208	CONNECTOR (CIRC),WAFE	YW396-08AV(8P-1,3,6,8)RED	YEON HO	CON3(RED)
1	6	6630VM04309	CONNECTOR (CIRC),WAFE	YW396-10AV(10P-1,2,4,6,8,10)BLUE	YEON HO	CON5(YELLOW)
1	7	6630VM04410	CONNECTOR (CIRC),WAFE	YW396-09AV(9P-1,3,5,8)YELLOW	YEON HO	CON4(BLUE)
1	8	6630JB8004L	CONNECTOR (CIRC),WAFER	SMW250 YEONHO 12P 2.5MM STRAIGHT	YEON HO	CON6
1	9	6630JB8004D	CONNECTOR (CIRC),WAFER	SMW250 YEONHO 5P 2.5MM STRAIGHT SN	YEON HO	CON7
1	10	0IZZJB2034Z	IC,DRAWING	TMP87C841N 64P,SDIP BK HK-PJT M	TOSHIBA	IC1(C=D)
1	11	0ISTLKE016A	IC,LINEAR	KIA78L05BP	KEC	IC2
1	12	0IKE704200A	IC,KEC	KIA7042P 3P BK RESET	KEC	IC6
1	13	0IKE650030B	IC,KEC	KID65003AP "18P,SDIP" BK DRIVE	KEC	IC7
2	14	0ITO623080C	IC,DRAWING	62308 16PIN SDIP BK DRIVE IC ST	TOSHIBA	IC8,9
1	15	0IKE431000A	IC,KEC	KIA431 3 PIN TP - -	KEC	IC5
1	16	0IPMGNE001A	IC,POWER MANAGEMENT	PS2561-1 NEC 4P,DIP BK = TLP762	NEC	IC4
1	17	6212W5M002A	RESONATOR,CERAMIC	CSTS0400 MURATA 4MHZ +/-0.5% TP	MURATA	OSC1
1	18	6102JB8001B	VARISTOR	INR14D621 ILJIN 620V 10% WORLD	IL JIN	VA1
1	19	6920JB2004D	RELAY	DH12D1-O-Q MATSUSHITA 250VAC 16A	MATSUSHITA	RY1
4	20	6920JB2003A	RELAY	G5N-1A OMRON (JAPAN)DC12V 16.7	OMRON	RY3,4,5,6
1	21	0IPMGSK003A	IC,POWER MANAGEMENT	STR-A6351 SANKEN 8 DIP ST SMPS	SANKEN	IC3
1	22	0TR106009AF	TRANSISTOR,BIPOLARS	KRC 106M KEC	KEC	Q3
1	23	0DRS800110A	DIODE,RECTIFIERS	GBL06 BK SHINDENGEN 600V 4A	SHINDENKEN	BD1
1	24	0DRSA00070A	DIODE,RECTIFIERS	RL2 SANKEN BK NON 400V 2A 40A 5	SHINDENKEN	D3
2	25	0DR107009AA	DIODE,RECTIFIERS	FR107 TP DELTA DO41 1000V 1A 3	DELTA/평창	D1,2
1	26	0DD400409AC	DIODE,RECTIFIER	RECT1N4004 TP	DELTA/평창	D4
1	27	0CE476ZV6E0	CAPACITOR,FIXED ELECT	47UF HE 450V 20% BULK SNAP IN	SAM HWA	CE1
1	28	0CE687YH6E0	CAPACITOR,FIXED ELECT	680UF RX 25V 20% BULK SNAP IN	SAM HWA	CE3
1	29	0CE227BF638	CAPACITOR,FIXED ELECT	220UF KME TYPE 16V 20% FM5 TP 5	RUBICON,SAMHWA	CE4
1	30	0CE226EK638	CAPACITOR,FIXED ELECT	22UF KME TYPE 50V 20% FM5 TP 5	RUBICON,SAMHWA	CE2
5	31	0CE106AK638	CAPACITOR,FIXED ELECT	10UF KM TYPE 50V 20% FM5 TP 5	RUBICON,SAMHWA	CE5~9
1	32	0CQ33418670	CAPACITOR,FIXED FILM	0.33UF D 275V M M/PP NI R	PILKO	CM1
1	33	0CQ22418670	CAPACITOR,FIXED FILM	0.22UF D 275V M M/PP NI R	PILKO	CM2
1	34	0CQ4732Y430	CAPACITOR,POLYESTER	47000PF S 630V J M/PE NI R	SAM HWA	CM3
1	35	0CQ2241N630	CAPACITOR,POLYESTER	0.22UF D 100V M M/PE NI R	SAM HWA	CC6
1	36	0CK22102510	CAPACITOR,FIXED CERAM	220P 2KV K B S	DOOSAN/SAM HWA	CC5
5	37	0CK2230K949	CAPACITOR,FIXED CERAM	22NF 50V Z F TA52	TAE YANG	CC9,10,11,12,15
6	38	0CK1040K949	CAPACITOR,FIXED CERAM	0.1UF D 50V 80%,-20% F(Y5V) TA5	TAE YANG	CC2,3,4,7,8,14
1	39	0CK4710K519	CAPACITOR,CERAMIC (HI	470PF 50V K B TA52	TAE YANG	CC1
1	40	0DZMR00029A	DIODE,ZENERS	1N5232B MOTORORA TP DO34 0.5W 5	DELTA/평창	ZD1
1	41	0RS5602K641	RESISTOR,FIXED METAL	56K OHM 2 W 5.00% F20	SMART	R2
1	42	0RS4703J609	RESISTOR,FIXED METAL	470K OHM 1 W 5% TA52	SMART	R3
1	43	0RS0121J609	RESISTOR,FIXED METAL	1.2 OHM 1 W 5% TA52	SMART	ROCP
1	44	0RD0822G609	RESISTOR,FIXED CARBON	82 OHM 1/4 W 5.00% TA52	SMART	R4
1	45	0RD6800G609	RESISTOR,FIXED CARBON	680 OHM 1/4 W 5.00% TA52	SMART	R6
6	46	0RD2001G609	RESISTOR,FIXED CARBON	2K OHM 1/4 W 5.00% TA52	SMART	R13,14,15,16,18,19
1	47	0RD4701G609	RESISTOR,FIXED CARBON	4.7K OHM 1/4 W 5.00% TA52	SMART	R11
1	48	0RD6801G609	RESISTOR,FIXED CARBON	6.8K OHM 1/4 W 5.00% TA52	SMART	R5
1	49	0RD1004G609	RESISTOR,FIXED CARBON	1M OHM 1/4 W 5.00% TA52	SMART	R1
1	50	0RD1004F609	RESISTOR,FIXED CARBON	1M OHM 1/6 W 5.00% TA52	SMART	R12
1	51	0RD1002G609	RESISTOR,FIXED CARBON	10K OHM 1/4 W 5.00% TA52	SMART	RCUL
1	52	0RD1002G609	RESISTOR,FIXED CARBON	10K OHM 1/4 W 5.00% TA52	SMART	RCUR
1	53	0RD1002G609	RESISTOR,FIXED CARBON	10K OHM 1/4 W 5.00% TA52	SMART	RCBL
1	54	0RD1002G609	RESISTOR,FIXED CARBON	10K OHM 1/4 W 5.00% TA52	SMART	RCBR
1	55	0RN1002G409	RESISTOR,FIXED METAL	10K OHM 1/4 W 1.00% TA52	SMART	RT1
4	56	0RN2612G409	RESISTOR,FIXED METAL	26.1K OHM 1/4 W 1.00% TA52	SMART	RR1,2,3,4
4	57	0RD1002G609	RESISTOR,FIXED CARBON	10K OHM 1/4 W 5.00% TA52	SMART	R20~23
2	58	0RD1001G609	RESISTOR,FIXED CARBON	1K OHM 1/4 W 5.00% TA52	SMART	R8,17
1	59	0RD1801G609	RESISTOR,FIXED CARBON	1.8K OHM 1/4 W 5.00% TA52	SMART	R7
1	60	0RN2201G409	RESISTOR,FIXED METAL	2.2K OHM 1/4 W 1.00% TA52	SMART	R10
1	61	0RN9101G409	RESISTOR,FIXED METAL	9.1K OHM 1/4 W 1.00% TA52	SMART	R9
2	62	6104JB8001A	RESISTOR,DRAWING	11A RA 1/4W 10K J	SMART	RAR1,2
1	63	6210JB8001A	CORE (CIRC),BEAD	BFS3510A0 SAMWHA 35X10MM AXIAL	SAM HWA	FB1
1	64	6600RRT001W	SWITCH,TACT	THVV502GAA POSTECH 12V DC 50MA	POSTEC	TEST
1	65	6200JB8003A	FILTER(CIRC),NOISE	3A 3MH 250V CV430030 A345-PJT C	TNC	L1
1	66	6200JB8007X	FILTER(CIRC),EMC	UV11-05320 TNC BK 0.5A 32MH	TNC	L2
1	67	0FZZJB3001A	FUSE	250V 2A SLOW-BLOW LITTELFUSE,T	SAMJU	FUSE1
20	68	43607015	JUMP WIRE	0.6MM 10MM - - -	10MM	J01~15,17~21
1	69	43607015	JUMP WIRE	0.6MM 10MM - - -	12.5MM	J16
8	70	43607015	JUMP WIRE	0.6MM 10MM - - -	7.5MM	JCUL1,2,JCUR1,2,JCBL1,2,JCBR1,2

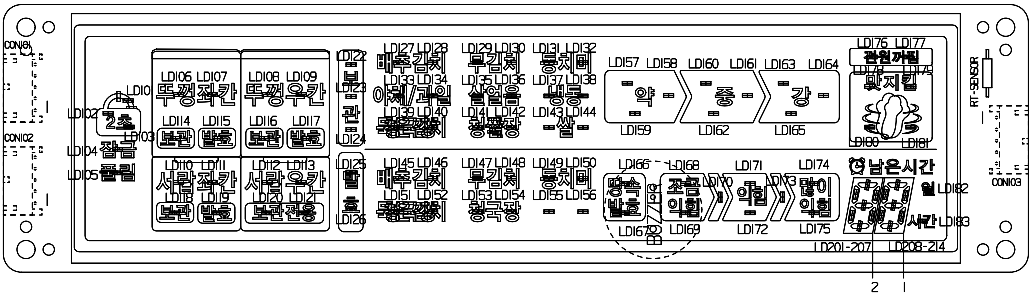
MICOM function and circuit description

N	WORK					
08 ??藏?240L 110V~115V, 50/60Hz	APPLICATION					
Qty	No	P/NO	DESCRIPTION	SPEC	MAKER	REMARK
1	1	6870JB8204B	PWB(PCB)	ATHENA1-PJT MAIN PCB(충ix)	DOOSAN	FR1,1.6T
1	2	6170JB2010D	TRANSFORMER,SMPS[COIL	A3-PJT 12.5V 1A 110V	SAM IL	TRANS
1	3	6630AQ9106D	CONNECTOR (CIRC),WAFE	YW396-09AV	YEON HO	CON1
1	4	6630VM04107	CONNECTOR (CIRC),WAFE	YW396-07AV(7P-1,2,5,7)	YEON HO	CON2
1	5	6630VM04208	CONNECTOR (CIRC),WAFE	YW396-08AV(8P-1,3,6,8)RED	YEON HO	CON3(RED)
1	6	6630VM04309	CONNECTOR (CIRC),WAFE	YW396-09AV(9P-1,3,5,8)YELLOW	YEON HO	CON5(YELLOW)
1	7	6630VM04410	CONNECTOR (CIRC),WAFE	YW396-10AV(10P-1,2,4,6,8,10)BLUE	YEON HO	CON4(BLUE)
1	8	6630JB8004L	CONNECTOR (CIRC),WAFER	SMW250 YEONHO 12P 2.5MM STRAIGHT	YEON HO	CON6
1	9	6630JB8004D	CONNECTOR (CIRC),WAFER	SMW250 YEONHO 5P 2.5MM STRAIGHT SN	YEON HO	CON7
1	10	0IKE780500X	IC, LINEAR	KIA78L05BP T0-92L TP 5V REGULATOR	KEC	IC2
1	11	0IKE704200D	IC,KEC	KIA7042P 2K/TP 4.2 RESET KEC - - - -	KEC	IC6
1	12	0IKE650030B	IC,KEC	KID65003AP "18P,SDIP" BK DRIVE	KEC	IC7
2	13	0ITO623080C	IC,DRAWING	TD62308AP 16PIN SDIP BK DRIVE IC ST	TOSHIBA	IC8,9
1	14	0IKE431000B	IC,KEC	KIA431 (TP) - - - -	KEC	IC5
1	15	0IPMGNE001A	IC,POWER MANAGEMENT	PS2561-1 NEC 4P,DIP BK = TLP762	NEC	IC4
1	16	6212BA3041A	RESONATOR,CERAMIC	CSTLS4M00G53-A0 MURATA 4.00MHZ +/-0.5% 15P	MURATA	OSC1
1	17	6102W5V007A	VARISTOR	SVC331D-14A	SAMHWA	VA1
1	18	6920JB2004D	RELAY	DH12D1-O-Q, DH1U-Q (JAPAN) DAI	DEC	RY1
5	19	6920JB2003D	RELAY	G5NB-1A-E(JAPAN) 250VAC 5A 12VDC 1A NO VE	OMRON	RY3,4,5,6,7
		6920JB2003E		G5NB-1A-E(CHINA) 250VAC 5A 12VDC 1A NO VE	OMRON	
1	20	0IPMGSK003A	IC,POWER MANAGEMENT	STR-A6351 SANKEN 8 DIP ST SMPS	SANKEN	IC3
1	21	0TR106009AF	TRANSISTOR,BIPOLARS	KRC 106M KEC	KEC	Q3
1	22	0DB360000AA	DIODE,RECTIFIERS	D3SBA60 BK SHINDENGEN 600V 4A	SHINDENKEN	BD1
1	23	0DRSA00070A	DIODE,RECTIFIERS	RL2 SANKEN BK NON 400V 2A 40A 5	SANKEN	D3
2	24	0DR107009AA	DIODE,RECTIFIERS	FR107 TP DELTA DO41 1000V 1A 3	DELTA/PYEONGCHANG	D1,2
1	25	0DD400409AC	DIODE,RECTIFIER	RECT1N4004 TP	DELTA/PYEONGCHANG	D4
1	26	0CE476ZV6E0	CAPACITOR,FIXED ELECT	47UF HE 450V 20% BULK SNAP IN	SAMHWA	CE1
1	27	0CE687YH6E0	CAPACITOR,FIXED ELECT	680UF RX 25V 20% BULK SNAP IN	SAMHWA	CE3
1	28	0CE227BF638	CAPACITOR,FIXED ELECT	220UF KME TYPE 16V 20% FM5 TP 5 (RG/YXA/SM)(105 °C)	SAMYOUNG,SAMHWA	CE4
1	29	0CE106EK638	CAPACITOR,FIXED ELECT	10UF KMG TYPE 50V 20% FM5 TP 5	SAMYOUNG,SAMWHA	CE2
5	30	0CE106EK638	CAPACITOR,FIXED ELECT	10UF KMG TYPE 50V 20% FM5 TP 5 (RG/YXA/SM)(105 °C)	SAMYOUNG,SAMWHA	CE5-9
1	31	0CQ33418670	CAPACITOR,FIXED FILM	0.33UF D 275V M M/PP NI R	PILKOR	CM1
1	32	0CQ22418670	CAPACITOR,FIXED FILM	0.22UF D 275V M M/PP NI R	PILKOR	CM2
1	33	0CF4731Y470	CAPACITOR,FIXED FILM	0.047UF D 630V 0.05 BULK M/PP NI	PILKOR	CM3
1	34	0CK2240K949	CAPACITOR,FIXED CERAM	220NF D 50V 80%	TAE YANG	CC6
1	35	0CG2200U630	CAPACITOR,CERAM,RADIAL	SD2G222M12BW1 2200PF 20% 400V Y5U	SAMHWA	CC5
5	36	0CK2230K949	CAPACITOR,FIXED CERAM	22NF 50V Z F TA52	TAE YANG	CC9,10,11,12,15
6	37	0CK1040K949	CAPACITOR,FIXED CERAM	0.1UF D 50V 80%,-20% F(Y5V) TA5	TAE YANG	CC2,3,4,7,8,14
1	38	0CK4710K519	CAPACITOR,CERAMIC (HI	470PF 50V K B TA52	TAE YANG	CC1
1	39	0DZMR00029A	DIODE,ZENERS	1N5232B MOTORORA TP DO34 0.5W 5	ROHM	ZD1
1	40	0RS5602K641	RESISTOR,FIXED METAL	56K OHM 2 W 5.00% F20	SMART	R2
1	41	0RS3303J609	RESISTOR,FIXED METAL	330K OHM 1 W 5% TA52	SMART	R3
1	42	0RS0510J609	RESISTOR,FIXED METAL	0.51 OHM 1 W 5% TA52	SMART	ROCP
1	43	0RD0822G609	RESISTOR,FIXED CARBON	82 OHM 1/4 W 5.00% TA52	SMART	R4
1	44	0RD6800G609	RESISTOR,FIXED CARBON	680 OHM 1/4 W 5.00% TA52	SMART	R6
6	45	0RD2001G609	RESISTOR,FIXED CARBON	2K OHM 1/4 W 5.00% TA52	SMART	R13,14,15,16,18,19
1	46	0RD4701G609	RESISTOR,FIXED CARBON	4.7K OHM 1/4 W 5.00% TA52	SMART	R11
1	47	0RD6801G609	RESISTOR,FIXED CARBON	6.8K OHM 1/4 W 5.00% TA52	SMART	R5
1	48	0RD1004G609	RESISTOR,FIXED CARBON	1M OHM 1/4 W 5.00% TA52	SMART	R1
1	49	0RD1004F609	RESISTOR,FIXED CARBON	1M OHM 1/6 W 5.00% TA52	SMART	R12
1	50	0RD1002G609	RESISTOR,FIXED CARBON	10K OHM 1/4 W 5.00% TA52	SMART	RCUL
1	51	0RD1002G609	RESISTOR,FIXED CARBON	10K OHM 1/4 W 5.00% TA52	SMART	RCUR
1	52	0RD1002G609	RESISTOR,FIXED CARBON	10K OHM 1/4 W 5.00% TA52	SMART	RCBL
1	53	0RD1002G609	RESISTOR,FIXED CARBON	10K OHM 1/4 W 5.00% TA52	SMART	RCBR
-	54	0RD1002G609	RESISTOR,FIXED CARBON	10K OHM 1/4 W 5.00% TA52	SMART	OP1
1	55	0RN1002G409	RESISTOR,FIXED METAL	10K OHM 1/4 W 1.00% TA52	SMART	RT1
4	56	0RN2612G409	RESISTOR,FIXED METAL	26.1K OHM 1/4 W 1.00% TA52	SMART	RR1,2,3,4
4	57	0RD1002G609	RESISTOR,FIXED CARBON	10K OHM 1/4 W 5.00% TA52	SMART	R20-23
2	58	0RD1001G609	RESISTOR,FIXED CARBON	1K OHM 1/4 W 5.00% TA52	SMART	R8,17
1	59	0RD1801G609	RESISTOR,FIXED CARBON	1.8K OHM 1/4 W 5.00% TA52	SMART	R7
1	60	0RN2201G409	RESISTOR,FIXED METAL	2.2K OHM 1/4 W 1.00% TA52	SMART	R10
1	61	0RN9101G409	RESISTOR,FIXED METAL	9.1K OHM 1/4 W 1.00% TA52	SMART	R9
2	62	6104JB8001A	RESISTOR,DRAWING	11A RA 1/4W 10K J	SMART	RAR1,2
1	63	6210JB8001A	CORE (CIRC),BEAD	BFS3510A0 SAMWHA 35X10MM AXIAL	SAM HWA	FB1
1	64	6600RRT001W	SWITCH,TACT	THVV502GAA POSTECH 12V DC 50MA	POSTEC	TEST
1	65	6200JB8003A	FILTER(CIRC),NOISE	3A 3MH 250V CV430030 A345-PJT C	TNC	L1
1	66	6200JB8007X	FILTER(CIRC),EMC	UV11-05320 TNC BK 0.5A 32MH	TNC	L2
1	67	0FZZJB3001A	FUSE	250V 2A SLOW-BLOW LITTELFUSE,T	SAMJU	FUSE1
20	68	43607015	JUMP WIRE	0.6MM 10MM - - -	10MM	J01-15,17-21
1	69	43607015	JUMP WIRE	0.6MM 10MM - - -	12.5MM	J16
8	70	43607015	JUMP WIRE	0.6MM 10MM - - -	7.5MM	JCUL1,2,JCUR1,2,JCBL1,2,JCBR1,2
-	71	43607015	JUMP WIRE	0.6MM 10MM - - -	10MM	J30,40
3.0g	72	SS0000008AA	SOLDER,SOLDERING	SR-34 PB FREE, LFM-48	HUISUNG	
25g	73	SSWZU-L05AA	SOLDER,SOLDERING	LFM-38, SN 3.0AG-0.5CU% 3.0MM	HUISUNG	
1.5g	74	7245ZB0004A	FLUX	SV-PBF-06 KSK 12.5 WT% 0.815+-0.003		

MICOM function and circuit description

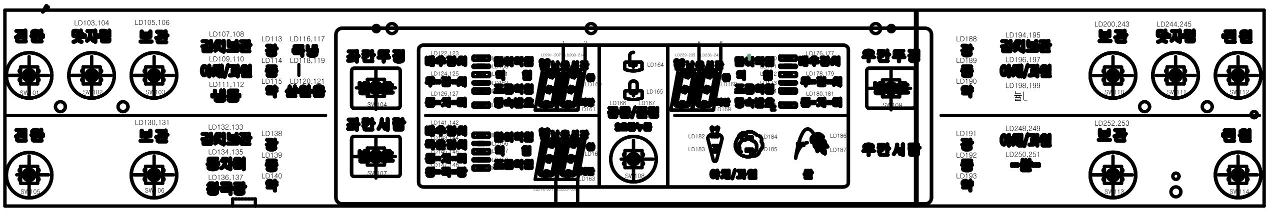
5-4-3. PWB (PCB) assembly and display parts diagram and parts list (6871JB1395_)

※ The parts diagram and parts list can slightly change according to the situation.



F	E	D	C	B	A	WORK					
ATHENAI FIGHTING 240L	ATHENAI FIGHTING 200L	ATHENAI STANDARD 240L	ATHENAI STANDARD 200L	ATHENAI PRMIUM 240L	ATHENAI PRMIUM 200L	APPLICATION					
Qty	Qty	Qty	Qty	Qty	Qty	No	P/NO	DESCRIPTION	SPEC	MAKER	REMARK
1	1	1	1	1	1	1	6870JB8214A	PWB(PCB)	ATHENAI-PJT DISPLAY PCB	DAEDUCK	STH
1	1	1	1	1	1	2	----------	REFLECTOR	NOLYL	HAENG SUNG	-
-	-	-	-	-	-	3	-	-	-	-	-
-	-	1	1	1	1	4	4140JB1054A	NAME PLATE,P(H)	ATHENAI-PJT FRM'&STD' 200,240L	HAENG SUNG	투과율70%
1	1	-	-	-	-	5	4140JB1054B	NAME PLATE,P(H)	ATHENAI-PJT FGT' 200,240L	HAENG SUNG	투과율70%
-	-	-	-	-	-	6	-	-	-	-	-
-	-	-	-	-	-	7	-	-	-	-	-
-	-	-	-	-	-	8	6630JB8004D	CONNECTOR (CIRC),WAFER	SMW250 YEONHO 5P 2.5MM (STRAIGHT TYPE)	YEON HO	CON101
1	1	1	1	1	1	9	6630AQ9159D	CONNECTOR (CIRC),WAFER	SMAW250-05G (ANGLE TYPE)	YEON HO	CON101
2	2	2	2	2	2	10	6630AQ9159E	CONNECTOR (CIRC),WAFER	SMAW250-06G (ANGLE TYPE)	YEON HO	CON102,103
-	-	1	1	1	1	11	0IZZJB2053T	IC,DRAWING	TMP86PM47U 44P QFP TRAY OTP AHHENAI-PJT	TOSHIBA	IC101
1	1	-	-	-	-	12	0IZZJB2053U	IC,DRAWING	TMP86PM47U 44P QFP TRAY OTP AHHENAI-PJT	TOSHIBA	IC101
-	-	-	-	-	-	13	0IZZJB2053V	IC,DRAWING	TMP86PM47U 44P QFP TRAY OTP AHHENAI-PJT	TOSHIBA	IC101
-	-	-	-	-	-	14	0IZZJB2053W	IC,DRAWING	TMP86PM47U 44P QFP TRAY OTP AHHENAI-PJT	TOSHIBA	IC101
-	-	-	-	-	-	15	0IZZJB2053X	IC,DRAWING	TMP86PM47U 44P QFP TRAY OTP AHHENAI-PJT	TOSHIBA	IC101
-	-	-	-	-	-	16	0IZZJB2053Y	IC,DRAWING	TMP86PM47U 44P QFP TRAY OTP AHHENAI-PJT	TOSHIBA	IC101
-	-	-	-	-	-	17	-	-	-	-	-
1	1	1	1	1	1	18	0ISTLKE002A	IC,STANDARD LOGIC	KIA78L05F KEC SOT-89 TP REGULATOR	KEC	IC102
1	1	1	1	1	1	19	0ISTLKE003A	IC,STANDARD LOGIC	KIA7042AF KEC SOT-89 TP RESET IC	KEC	IC103
-	-	-	-	-	-	20	0ISG934660D	IC,SGS-THOMSON	M93C46-WMN6T 8PIN TP AUTO RESTART SMD	ST	IC104
1	1	1	1	1	1	21	0IRH934600D	IC,ROHM	BR93LC46RF-W 8PIN SOP BK EEPROM -	ROHM	IC104
2	2	2	2	2	2	22	0ISTLMI001A	IC,STANDARD LOGIC	M54563AF MITSUBISHI 20 R/TP CONVERT	MITSUBISHI	IC105,107
2	2	2	2	2	2	23	0IKE650030C	IC,KEC	KID65003AF 16SOP BK 7CH DRIVER	KEC	IC106,108
1	1	1	1	1	1	24	0ISTLKE004A	IC,STANDARD LOGIC	KRA106S KEC SOT-23 TP TRANSISTOR	KEC	Q102
3	3	3	3	3	3	25	0ISTLKE005A	IC,STANDARD LOGIC	KRC106S KEC SOT-23 TP TRANSISTOR	KEC	Q101,103,104
-	-	-	-	-	-	26	-	-	-	-	-
-	-	-	-	-	-	27	-	-	-	-	-
1	1	1	1	1	1	28	6212BB3245A	RESONATOR,CERAMIC	CSTCR4M00G53-R0 MURATA 4.0MHZ +/- 0.5% T/R SMD	MURATA	OSC101
-	-	-	-	-	-	29	-	-	-	-	-
-	-	-	-	-	-	30	-	-	-	-	-
1	1	1	1	1	1	31	0CE107VF6DC	CAPACITOR,FIXED ELECTR	100UF MV 16V 20% R/TP(SMD) SMD	SAMHWA,RUBYCO,G-LUXON	CE102
1	1	1	1	1	1	32	0CE476VF6DC	CAPACITOR,FIXED ELECTR	47UF MV 25V 20% R/TP(SMD) SMD	SAMHWA,RUBYCO,G-LUXON	CE103
-	-	-	-	-	-	33	-	-	-	-	-
-	-	-	-	-	-	34	-	-	-	-	-
8	8	8	8	8	8	35	0CK104DK94A	CAPACITOR,FIXED CERAMI	100NF 2012 50V 80%,-20% R/TP F(Y5V)	MURATA	CC101-108
1	1	1	1	1	1	36	0CK102DK96A	CAPACITOR,FIXED CERAMI	1NF 2012 50V 80%,-20% R/TP X7R	MURATA	CC109
-	-	-	-	-	-	37	-	-	-	-	-
-	-	-	-	-	-	38	-	-	-	-	-
-	-	-	-	-	-	39	-	-	-	-	-
1	1	1	1	1	1	40	0RH1000L622	RESISTOR,METAL GLAZED(	100 OHM 1 / 8 W 2012 5.00% D	SMART,ROHM	R127
1	1	1	1	1	1	41	0RD2200E672	RESISTOR,FIXED CARBON	220 OHM 1/8 W 5% 2012 R/TP	SMART,ROHM	R106
2	2	2	2	2	2	42	0RD1001E672	RESISTOR,FIXED CARBON	1K OHM 1/8 W 5% 2012 R/TP	SMART,ROHM	R102,107
2	2	2	2	2	2	43	0RD2001E672	RESISTOR,FIXED CARBON	2K OHM 1/8 W 5% 2012 R/TP	SMART,ROHM	R101,126
12	12	12	12	12	12	44	0RD4701E672	RESISTOR,FIXED CARBON	4.7K OHM 1/8 W 5% 2012 R/TP	SMART,ROHM	R103,104,108,109,125,128-134
1	1	1	1	1	1	45	0RD1004E672	RESISTOR,FIXED CARBON	1M OHM 1/8 W 5% 2012 R/TP	SMART,ROHM	R105
-	-	-	-	-	-	46	-	-	-	-	-
1	1	1	1	1	1	47	-----------	RESISTOR,METAL GLAZED(	120 OHM 1 / 4 W 3216 5.00% D	SMART,ROHM	R145
1	1	1	1	1	1	48	-----------	RESISTOR,METAL GLAZED(	100 OHM 1 / 2 W 5025 5.00% D	SMART,ROHM	R135
5	5	5	5	5	5	49	-----------	RESISTOR,METAL GLAZED(	180 OHM 1 / 2 W 5025 5.00% D	SMART,ROHM	R121-124,142
7	7	7	7	7	7	50	-----------	RESISTOR,METAL GLAZED(	240 OHM 1 / 2 W 5025 5.00% D	SMART,ROHM	R120,136-141
-	-	-	-	-	-	51	-	-	-	-	-
-	-	-	-	-	-	52	-	-	-	-	-
-	-	-	-	-	-	53	-	-	-	-	-
1	1	1	1	1	1	54	0DZRM00188A	DIODE,ZENERS	RLZ ROHM R/TP LLDS(LL-34) 500MW 5.6V 20MA .PF	DELTA,ROHM	ZD101
-	-	-	-	-	-	55	-	-	-	-	-
-	-	-	-	-	-	56	-	-	-	-	-
-	-	-	-	-	-	57	-	-	-	-	-
-	-	-	-	36	36	58	-----------	LED	19-213/BHC-AN2P2/3T SKY BLUE	EVERLIGHT	LD114,116,118,120,121
-	-	36	36	-	-		0DLLE0038AA	LED	LEDTECH ELECTRONICS LT8B32-UR-191T R/TP AMBER	LEDTECH	LD127-144,157-165,178-181
34	34	-	-	-	-		0DLLE0038AA	LED	LEDTECH ELECTRONICS LT8B32-UR-191T R/TP AMBER	LEDTECH	• "E,F" 작업시 LD143,144 삭제
-	-	-	-	15	15	59	-----------	LED	19-213/WID-AP202HY/3T WHITE	EVERLIGHT	LD101-113,176,177
-	-	-	-	-	-		0DLLE0038AA	LED	LEDTECH ELECTRONICS LT8B32-UR-191T R/TP AMBER	LEDTECH	
15	15	15	15	-	-		0DLLE0038AA	LED	LEDTECH ELECTRONICS LT8B32-UR-191T R/TP AMBER	LEDTECH	
-	-	39	39	39	39	60	0DLLE0038AA	LED	LEDTECH ELECTRONICS LT8B32-UR-191T R/TP AMBER	LEDTECH	LD115,117,119,145-154,166-175,201-214,
37	37	-	-	-	-		0DLLE0038AA	LED	LEDTECH ELECTRONICS LT8B32-UR-191T R/TP AMBER	LEDTECH	LD182,183 • "E,F" 작업시 LD153,154 삭제
-	-	-	-	-	-	61		-	-	-	-
-	-	-	-	-	-	62	-	-	-	-	-
-	-	-	-	-	-	63	-	-	-	-	-
1	1	1	1	1	1	64	6908JB8003A	BUZZER,PIEZO CERAMIC	BM-20B BUJEON PIEZO 4KHZ 85DB	BUJEON	BUZZER
							6908JB3002G	BUZZER,PIEZO CERAMIC	CBE2240BP DAE YOUNG PIEZO 4KHZ 90DB(CHINA)	DAE YOUNG	
1	1	1	1	1	1	65	6500JB3001A	SENSOR,TEMPERATURE	RT_SENSOR JAMES-TEC COMBI PCB	JAMES TECH	RT-SENSOR
-	-	-	-	-	-	66	-	-	-	-	-
2g	2g	2g	2g	2g	2g	67	SS0000008AA	SOLDER,SOLDERING	SR-34 PB FREE, LFM-48	HUISUNG	-
5g	5g	5g	5g	5g	5g	68	SSWZU-L05AA	SOLDER,SOLDERING	LFM-38, SN 3.0AG-0.5CU% 3.0MM	HUISUNG	-
0.5g	0.5g	0.5g	0.5g	0.5g	0.5g	69	59333105	FLUX	SG;0.825-0.830 KOREA F.H-206	KOKI	-
1	1	1	1	1	1	70	-	LABEL	-	-	-
-	-	-	-	-	-	71	-	-	-	-	-
-	-	-	-	-	-	72	-	-	-	-	-

MICOM function and circuit description

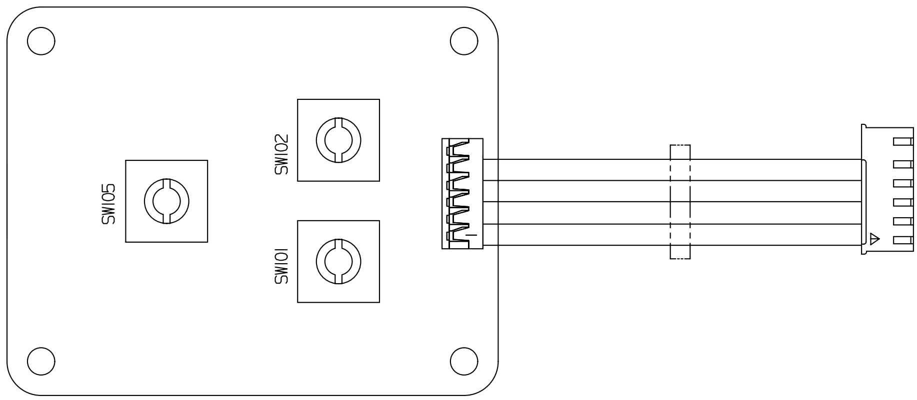


D	WORK					
TRINITY PRM 240L Modern Color	APPLICATION					
Qty	No	P/NO	DESCRIPTION	SPEC	MAKER	REMARK
1	1	EAX30619202	PWB(PCB)	07 TRINITY1 DRAWER TYPE LED MODULE (Ver 2.5)	DOOSAN(SUNGSIN)	FR4
1	2	MGW31191604	REFLECTOR,PCB	MOLD NA NORYL SUPER WHITE NO H;14.3mm	HAENG SUNG	NORYL
1	3	MGW31191605	REFLECTOR,PCB	MOLD NA NORYL SUPER WHITE NO H;14mm	HAENG SUNG	NORYL
1	4	MFT31175415	NAME PLATE(LEFT)	PRINTING '07 TRINITY-PJT COMPLEX MODERN COLOR	IL SAN	TRANSMISSION RATIO 70%
1	5	EAD31433101	DRAWING ASSEMBLY	JOINT TRINITY1-PJT DISPLAY JOINT -	HAENG SUNG	HARNESS JOINT
1	6	6630AQ9159D	CONNECTOR (CIRC),WAFER	SMW250 YEONHO 5P 2.5MM ANGLE TYPE	YEON HO	CON101
1	7	6630JB8004P	CONNECTOR (CIRC),WAFER	SMW250 15P 2.5MM 1R STRAIGHT DIP BK WHITE	YEON HO	CON102
1	8	6630AQ9159G	CONNECTOR (CIRC),WAFER	SMAW250 8P 2.50MM ANGLE TYPE	YEON HO	CON103
1	9	6630JB8004E	CONNECTOR (CIRC),WAFER	SMW250 6P 2.50MM 1R STRAIGHT DIP BK WHITE	YEON HO	CON104
1	10	EAN31431218	IC,DRAWING	TMP86FS49F TOSHIBA 64P BULK Flash 07TRINITY1 240L	TOSHIBA	IC101(EMPTY FLASH = EAN30784301)
1	11	0IPMGKE028A	IC,STANDARD LOGIC	KIA78L05F KEC 3PIN SOT-89 R/TP 5V 150MA REGULATOR	KEC	IC102
1	12	0ISTLKE003A	IC,STANDARD LOGIC	KIA7042AF KEC SOT-89 TP RESET IC	KEC	IC103
1	13	0ISG934660D	IC,SGS-THOMSON	M93C46-WMN6T 8PIN TP AUTO RESTART SMD	ST	IC104
		0IRH934600D	IC,ROHM	BR93LC46RF-W 8PIN SOP BK EEPROM -	ROHM	
2	14	0ISTLMI001B	IC,STANDARD LOGIC	TD62783AF TOSHIBA 18 R/TP CONVERT	TOSHIBA	IC105,108
		0IKE657830B	IC,STANDARD LOGIC	KID65783AF 20PIN SOP TRAY TR ARRAY BUFFER	KEC	
4	15	0IKE650030C	IC,KEC	KID65003AF 16SOP BK 7CH DRIVER	KEC	IC106,107,109,110
		0ISTL00066A	IC,STANDARD LOGIC	ULN2003A TOSHIBA 16PINSOP TAPPING NPN TRARRAY	TOSHIBA	
1	16	0ISTLKE004A	IC,STANDARD LOGIC	KRA106S KEC SOT-23 TP TRANSISTOR/ DTA143ZCA SOT-23	KEC/ CHANGJIANG	Q102
9	17	0ISTLKE005A	IC,STANDARD LOGIC	KRC106S KEC SOT-23 TP TRANSISTOR/ DTC143ZCA SOT-23	KEC/ CHANGJIANG	Q101,103,104,111-116
6	18	0ISTLKE006A	IC,STANDARD LOGIC	KTA1298 KEC SOT-23 TP TRANSISTOR	KEC/ CHANGJIANG	Q105-110
1	19	6212BB3245A	RESONATOR,CERAMIC	CSTCR4M00G53-R0 MURATA 4.0MHZ +/- 0.5% T/R SMD	MURATA	OSC101
1	20	0CE107VF6DC	CAPACITOR,FIXED ELECTR	100UF MV 16V 20% R/TP(SMD) SMD	SAMHWA,RUBYCO,G-LUXON	CE102
1	21	0CE476VF6DC	CAPACITOR,FIXED ELECTR	47UF MV 25V 20% R/TP(SMD) SMD	SAMHWA,RUBYCO,G-LUXON	CE103
8	22	0CK104DK94A	CAPACITOR,FIXED CERAMI	100NF 2012 50V 80%,-20% R/TP F(Y5V)	MURATA	CC101-108
3	23	0CK102DK96A	CAPACITOR,FIXED CERAMI	1NF 2012 50V 80%,-20% R/TP X7R	MURATA	CC109-111
6	24	0RJ1502E672	RESISTOR,METAL GLAZED(CHIP)	15KOHM 1/8 W 5% 2012 R/TP	SMART,ROHM	R108-113
2	25	0RJ1000E672	RESISTOR,METAL GLAZED(CHIP)	100 OHM 1/8 W 5% 2012 R/TP	SMART,ROHM	R161,162
1	26	0RJ2200E672	RESISTOR,FIXED CARBON	220 OHM 1/8 W 5% 2012 R/TP	SMART,ROHM	R106
2	27	0RJ1001E672	RESISTOR,FIXED CARBON	1K OHM 1/8 W 5% 2012 R/TP	SMART,ROHM	R102,107
10	28	0RJ2001E672	RESISTOR,FIXED CARBON	2K OHM 1/8 W 5% 2012 R/TP	SMART,ROHM	R101,114-119,139,140,155
19	29	0RJ4701E672	RESISTOR,FIXED CARBON	4.7K OHM 1/8 W 5% 2012 R/TP	SMART,ROHM	R103,104,158-160,20-30 ,141,142,156
1	30	0RJ1004E672	RESISTOR,FIXED CARBON	1M OHM 1/8 W 5% 2012 R/TP	SMART,ROHM	R105
1	31	0RJ0682G676	RESISTOR,METAL GLAZED(CHIP)	68 OHM 1 / 4 W 3216 5.00% DD	SMART,ROHM	
7	32	0RJ1800H680	RESISTOR,METAL GLAZED(CHIP)	180 OHM 1 / 2 W 5025 5.00% D	SMART,ROHM	R131-135,137,138
3	33	0RJ2400H680	RESISTOR,METAL GLAZED(CHIP)	240 OHM 1 / 2 W 5025 5.00% D	SMART,ROHM	R136,150,152
10	34	0RJ51003680	RESISTOR,METAL GLAZED(CHIP)	510 OHM 1 / 2 W 5025 5.00% D	SMART,ROHM	R143-149,151,153,154
1	35	0RD3900G676	RESISTOR,METAL GLAZED(CHIP)	390 OHM 1 / 4 W 3216 5.00% R/TP	SMART,ROHM	R157
9	36	0DSRM00068A	DIODE,SWITCHING	RLS4148 ROHM R/TP LLDS(LL-34) 75V 45	ROHM	D113-121
9	37	EBF38423201	SWITCH,TACT	IT-7050R 1C1P 12VDC 0.05A HORIZONTAL 200GF BK	INSUNG	SW101-109
1	38	0DZRM00188A	DIODE,ZENERS	RLZ ROHM R/TP LLDS(LL-34) 500MW 5.6V 20MA .PF	ROHM	ZD101
12	39	0DRRM00028A	DIODE,RECTIFIERS	RLR4004 ROHM R/TP SOT23 400V 1A 20A .SEC 10MA	DELTA,GENERAL	D101-112
57	40	0DLLE0038AA	LED	LEDTECH ELECTRONICS LT8B32-UR-191T R/TP AMBER	HARVATEK	LD122-127,141-148,149-159,160-163,201-228
28	41	0DLLE0038AA	LED	LEDTECH ELECTRONICS LT8B32-UR-191T R/TP AMBER	HARVATEK	LD168-169,170-181,229-242
36	42	0DLER0108AA	LED	19-213/G6C-AN1P2B/3T(N1,N2 Rank)	EVERLIGHT	LD103-121,130-140,182-187
2	43	0DLER0108AA	LED	19-213/G6C-AN1P2B/3T(N1,N2 Rank)	EVERLIGHT	LD164,167
2	44	0DLLE0038AA	LED	RED	HARVATEK	LD165,166
1	45	6908JB8003A	BUZZER,PIEZO CERAMIC	BM-20B BUJEON PIEZO 4KHZ 85DB	BUJEON	BUZZER
		6908JB3002G	BUZZER,PIEZO CERAMIC	CBE2240BP DAE YOUNG PIEZO 4KHZ 90DB(CHINA)	DAE YOUNG	
1	46	6500JB3001A	SENSOR,TEMPERATURE	RT_SENSOR JAMES-TEC COMBI PCB	JAMES TECH	RT-SENSOR
0.2g	47	SS0000008AA	SOLDER,SOLDERING	SR-34 PB FREE, LFM-48	HEESUNG	-
0.5g	48	SS0000019AA	METAL CREAM	LFM-48W TM-TS PB FREE HEESUNG METAL CREAM SNAGCU SN+3.0AG+0.5CU%- CREAM SNAGCU SN+3.0AG+0.5CU%	HEESUNG	-

MICOM function and circuit description

5-4-3. PWB (PCB) assembly, sub parts diagram and parts list (common for 6871JB2073A/B left and right)

※ The parts diagram and parts list can slightly change according to the situation.



B	A	WORK					
ATHENA1-PJT(복합식)	ATHENA3-PJT(뚜껑식)	APPLICATION					
Qty	Qty	No	P/NO	DESCRIPTION	SPEC	MAKER	REMARK
1	1	1	6870JB8219A	PWB(PCB)	'05 ATHENA1,3-PJT ALL	DOOSAN	FRI
-	-	2	-	-	-	-	-
-	-	3	-	-	-	-	-
-	4	4	6600R000008	SWITCH,TACT	JPT1212B JEIL 12VDC 50MA	남애전자	SW101-104
3	-	5	6600R000008	SWITCH,TACT	JPT1212B JEIL 12VDC 50MA	남애전자	SW101,102,105
-	4	6	0DD414809AD	DIODE,RECTIFIERS	IN4148 PYUNG CHANG TP52 DO	평창무역	D101-104
3	-	7	0DD414809AD	DIODE,RECTIFIERS	IN4148 PYUNG CHANG TP52 DO	평창무역	D101,102,103
-	-	8	-	-	-	-	-
-	-	9	-	-	-	-	-
1	1	10	-	HOUSING	#35022-0005	MOLEX	6P
5	5	11	-	CONTACT	#35021-1101(PBT)	MOLEX	-
-	-	12	-	-	-	-	-
1	1	13	-	HOUSING	#25048HS-5	MOLEX	5P
5	5	14	-	CONTACT	#25048HS	MOLEX	-
-	-	15	-	-	-	-	-
-	-	16	-	-	-	-	-
1	1	17	-	LEAD WIRE	VSF 0.18/12/0.3MM2	또는UL1007AWG24	YL(황색)
1	1	18	-	LEAD WIRE	VSF 0.18/12/0.3MM2	또는UL1007AWG24	BO(주황)
1	1	19	-	LEAD WIRE	VSF 0.18/12/0.3MM2	또는UL1007AWG24	RD(적색)
1	1	20	-	LEAD WIRE	VSF 0.18/12/0.3MM2	또는UL1007AWG24	BN(갈색)
1	1	21	-	LEAD WIRE	VSF 0.18/12/0.3MM2	또는UL1007AWG24	BK(흑색)
-	-	22	-	-	-	-	-
-	-	23	-	-	-	-	-
1g	1g	24	SS0000008AA	SOLDER,SOLDERI	SR-34 PB FREE, LFM-48	HUISUNG	-
2g	2g	25	SSWZU-L05AA	SOLDER,SOLDERI	LFM-38, SN 3.0AG-0.5CU% 3.0MM	HUISUNG	-
0.5g	0.5g	26	59333105	FLUX	SG;0.825-0.830 KOREA F.H-2	KOKI	-

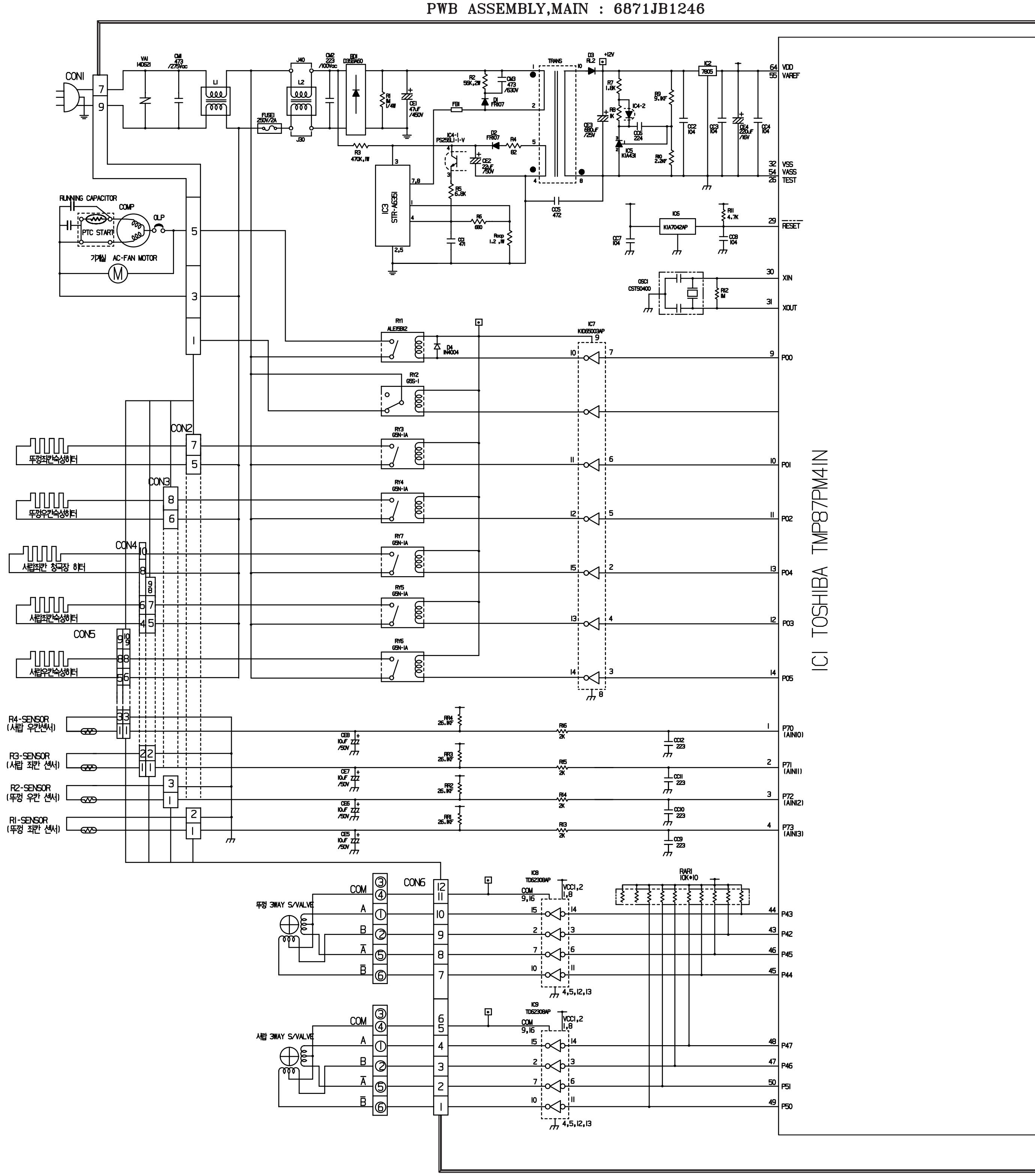
MICOM function and circuit description

5-5. PCB circuit diagram

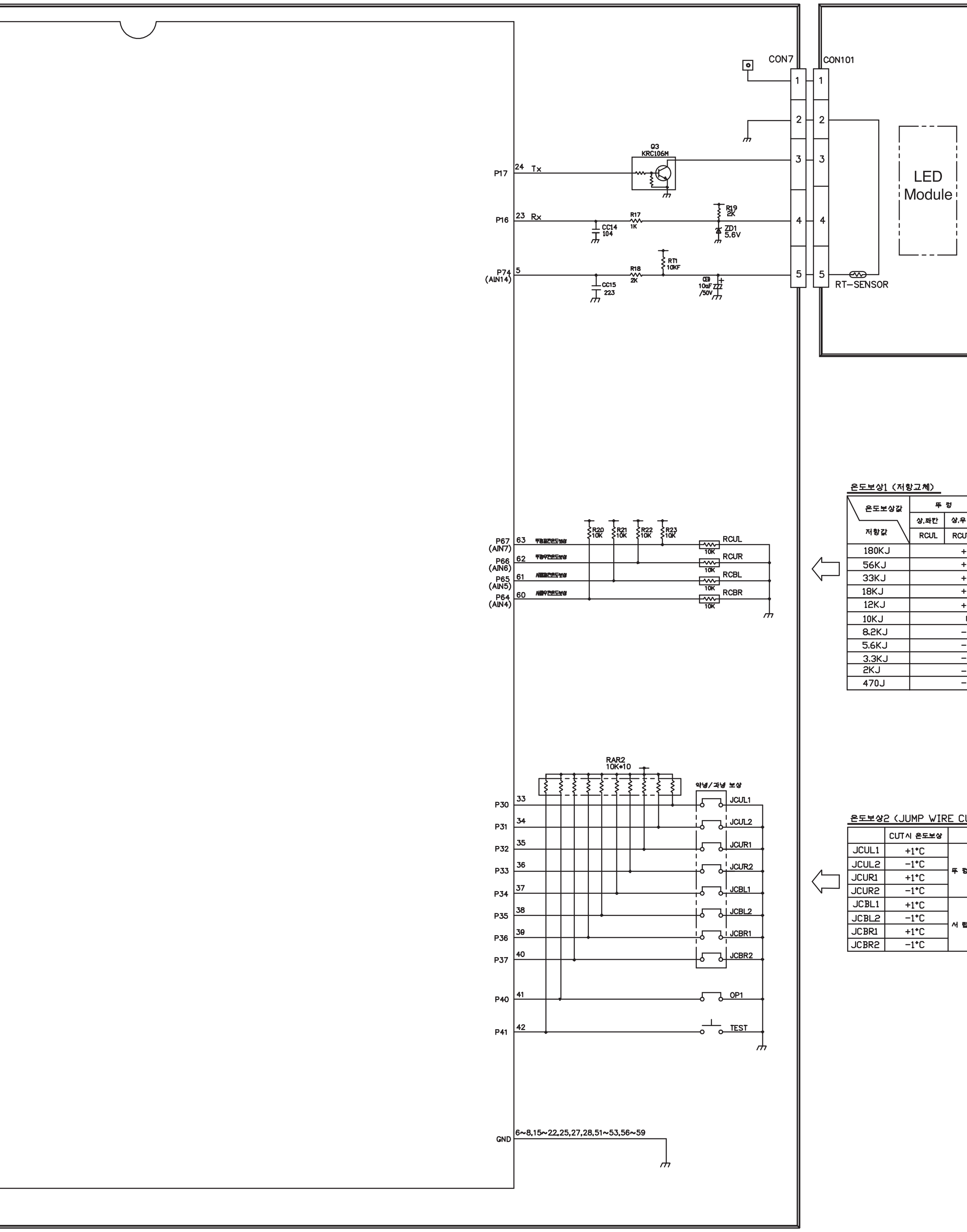
5-5-1. PWB (PCB) assembly and main circuit diagram (6871JB1246)

※ PCB circuit diagram can slightly change according to the situation.

PWB ASSEMBLY,MAIN : 6871JB1246



PWB(PCB) ASSEMBLY, DISPLAY
:6871JB1395, 6871JB1463



온도보상1 (저항교체)

온도보상값 / 저항값	뚜 껑		서 랍		비 고
	상,좌칸	상,우칸	하,좌칸	하,우칸	
	RCUL	RCUR	RCBL	RCBR	
180KJ	+2.5°C				따뜻하게 ⇧
56KJ	+2°C				
33KJ	+1.5°C				
18KJ	+1°C				
12KJ	+0.5°C				
10KJ	0°C				기 준
8.2KJ	−0.5°C				⇩ 차게
5.6KJ	−1°C				
3.3KJ	−1.5°C				
2KJ	−2°C				
470J	−2.5°C				

온도보상2 (JUMP WIRE CUT)

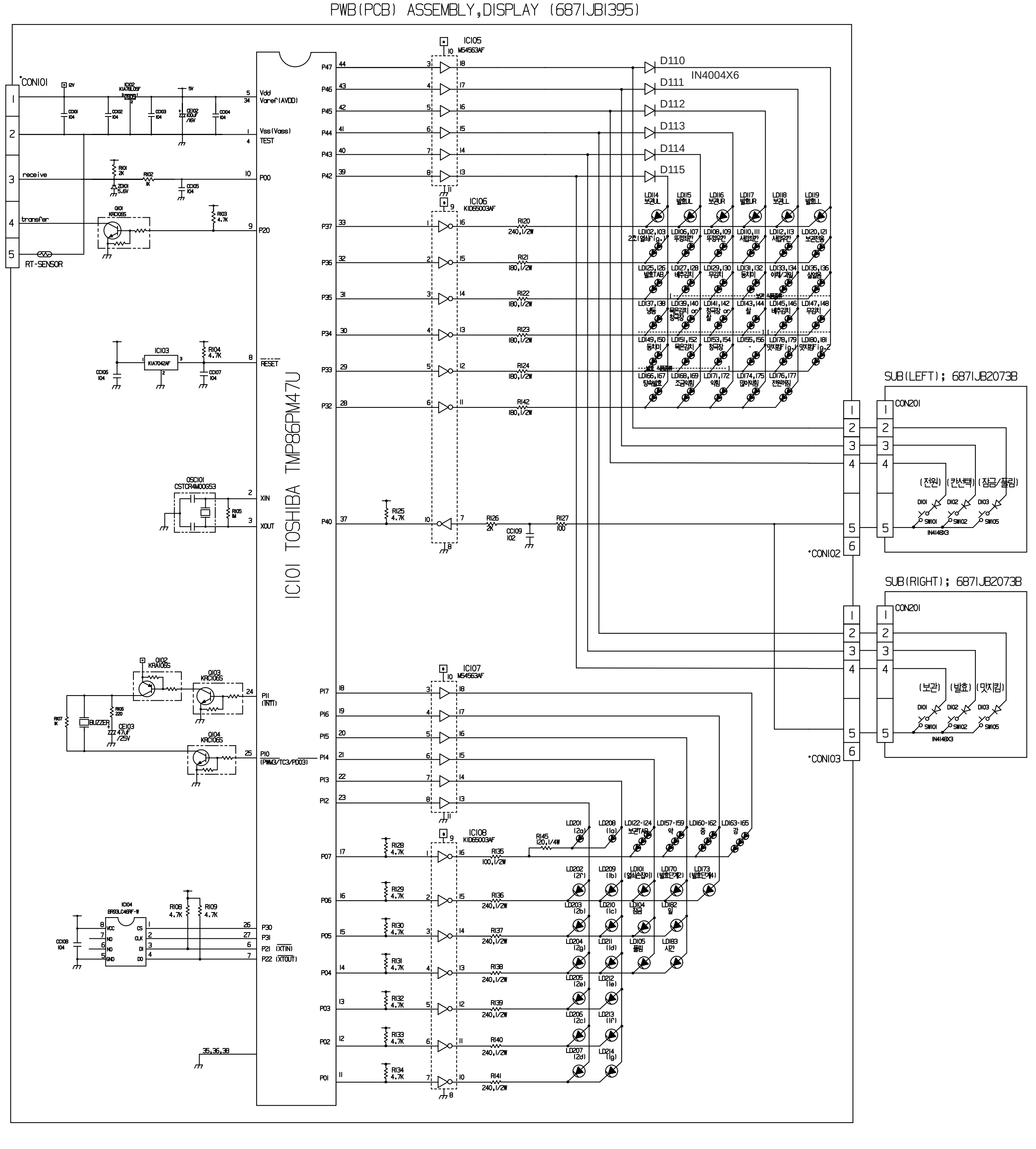
	CUT시 온도보상	비고	
JCUL1	+1°C	뚜 껑	상,좌칸
JCUL2	−1°C		
JCUR1	+1°C		상,우칸
JCUR2	−1°C		
JCBL1	+1°C	서 랍	하,좌칸
JCBL2	−1°C		
JCBR1	+1°C		하,우칸
JCBR2	−1°C		

MICOM function and circuit description

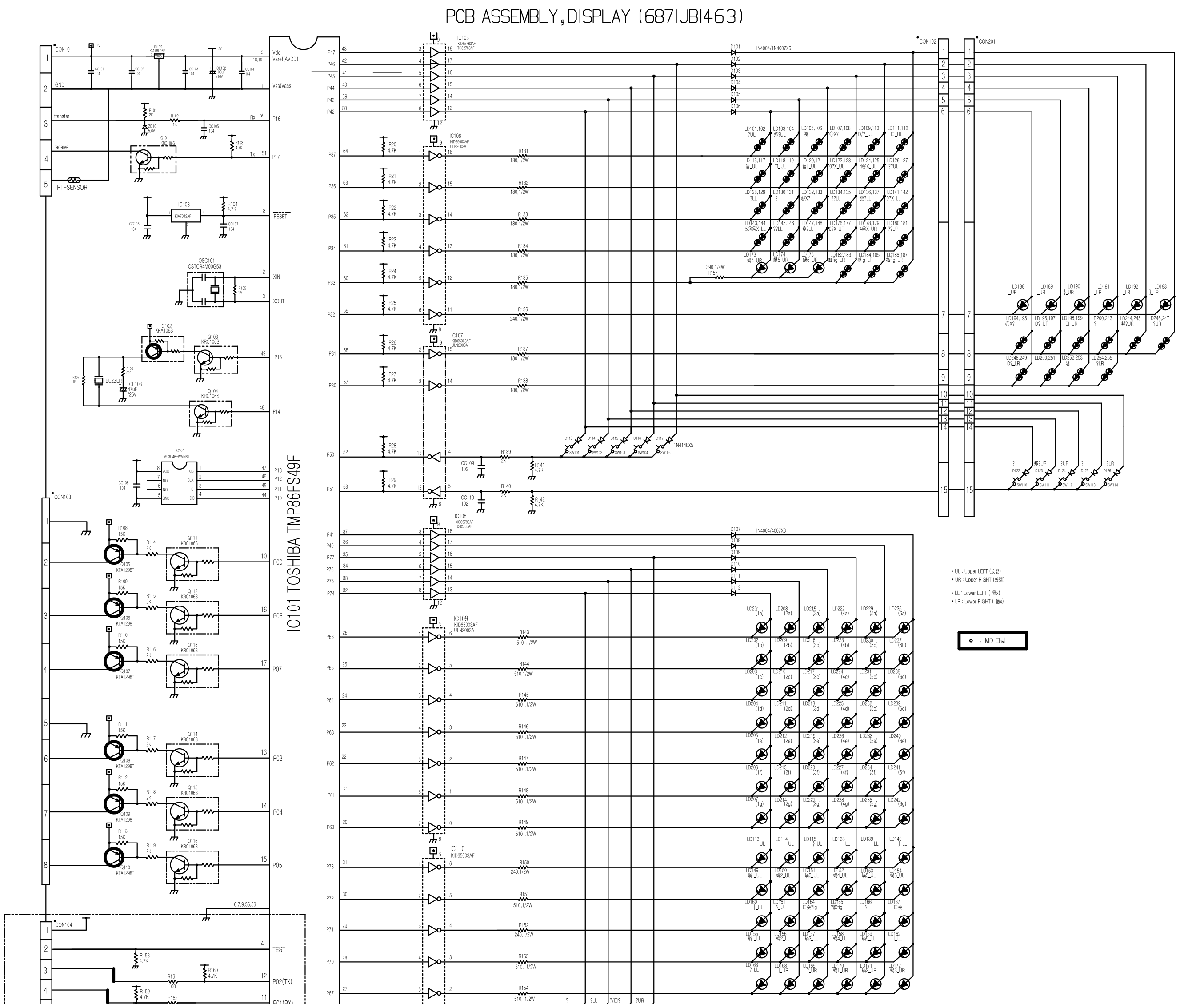
5-5-2. PWB (PCB) assembly and display circuit diagram (6871JB1395_)

※ The circuit diagram can slightly change according to the situation.

※ This includes the PWB (PCB) assembly and sub circuit diagram.



MICOM function and circuit description



Chapter 6. Freezing cycle and refrigerant

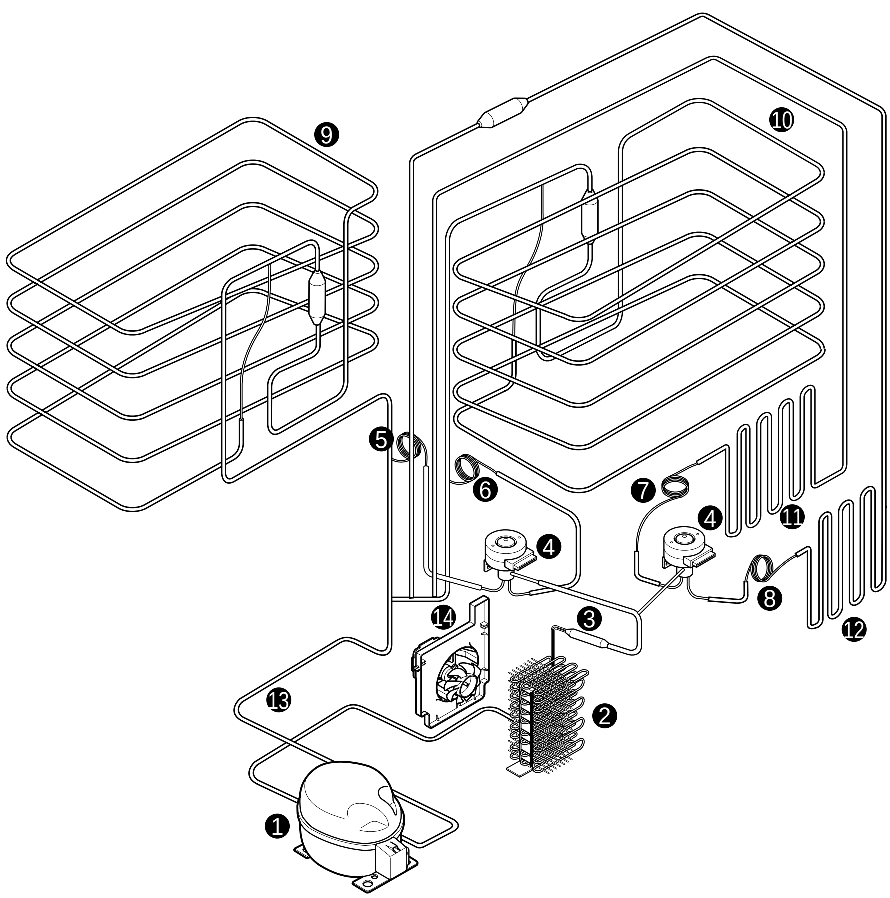
6-1. Freezing cycle (Freezing principle/Refrigerant gas circulation diagram)

6-1-1. Freezing principle

Freezing is an operation of maintaining a lower temperature (generally 0°…) than the natural temperature (usually ambient temperature surrounding us). This requires an insulated space, refrigerant (R134a) to absorb the heat and the circulation circuit (compressor, condenser, evaporator etc.) to operate the phase change of the refrigerant.

6-1-2. Refrigerant gas circulation diagram

1. Compressor
2. Wire condenser
3. Drier
4. 3-way valve (2 EA)
5. Capillary tube (lid left)
6. Capillary tube (lid right)
7. Capillary tube (drawer left)
8. Capillary tube (drawer right)
9. Evaporator (lid left)
10. Evaporator (lid right)
11. Evaporator (drawer left)
12. Evaporator (drawer right)
13. Suction pipe
14. Cooling fan



Freezing cycle and refrigerant

6-1-3. Operation description of each circulation circuit

No.	Parts name	Operation details	Refrigerant gas condition (input and output)
1	Compressor	Compress the refrigerant from low pressure to high pressure.	Low pressure gas ¡ High pressure gas Temperature(30°C) ¡ (80~120°C)
2	Condenser	High pressure gas refrigerant exhausts heat and becomes liquid refrigerant.	High pressure gas ¡ High pressure liquid Temperature(80~120°C) ¡ (40~60°C)
3	Drier	There is an absorbent that absorbs the moisture within the circulation circuit. (Moisture absorption device)	
4	Capillary tube	This is the long narrow pipe where high pressure refrigerant passes to reduce the pressure.	High pressure liquid ¡ Low pressure liquid Temperature(40~60°C) ¡ (-27°C)
5	Evaporator	Low pressure liquid refrigerant absorbs heat to change to low pressure gas refrigerant.	Low pressure liquid ¡ Low pressure gas Temperature(-27°C)
6	Suction pipe	This connects the evaporator and the compressor.	Low pressure gas ¡ Low pressure gas Temperature(-27°C) ¡ (30°C)

Caution

- ▶ Because the outlet of the capillary tube is where the high pressure refrigerant changes from high to low pressure, the low pressure refrigerant quickly diffuses to the evaporator, making flash sounds. (shik shik sound)
- ▶ When the low pressure liquid refrigerant evaporates from the evaporator, it is done throughout the whole pipe from inlet to outlet, making a sound of liquid refrigerant flowing. This can happen depending on the load condition of the refrigerator and on the evaporation, but it is not a problem.

6-2. Refrigerant

Refrigerant name	Characteristics	ODP	GWP	Remarks
R134a (ISO butane)	R134a is highly explosive (ISO butane) and need extra special care during refrigerator manufacturing and servicing. As an environmental friendly refrigerant, the ODP and GWP is respectively 0.	0	1200	Refrigerant

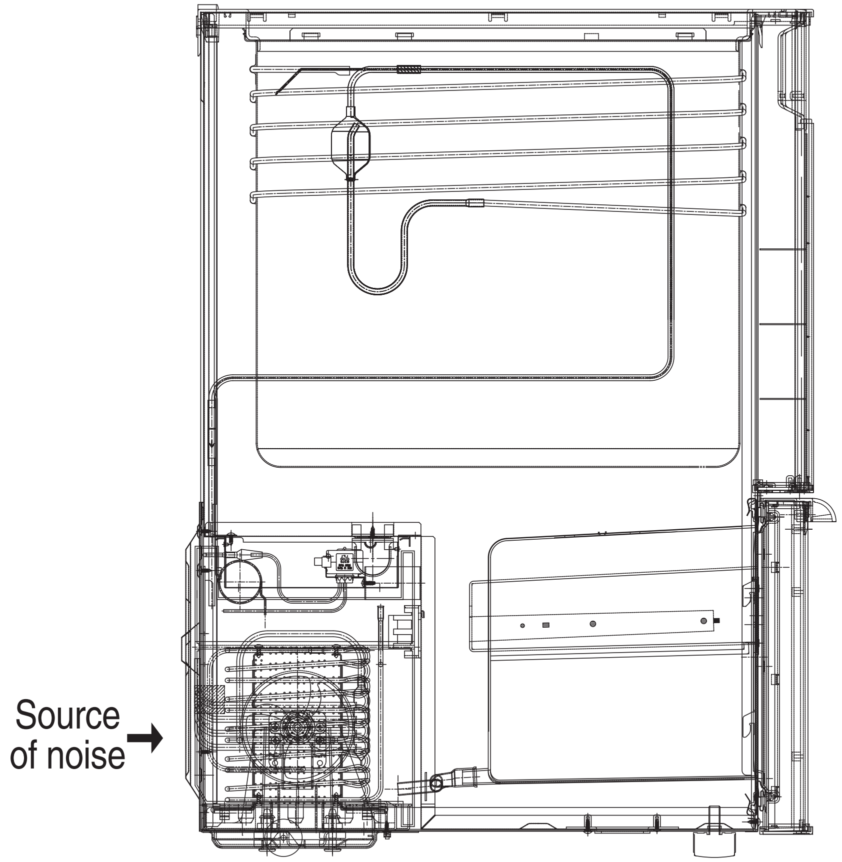
※ ODP: Ozone Depleting Potential (Relative index with CFC11 as 1.0)
GWP: Global Warming Potential (Relative index with CO2 as 1.0)

Chapter 7. General details about the product

7-1. Refrigerator noise

The structure of the freezing room and mechanical room, which are the sources of Kimchi refrigerator noise, is as follows.

Here you can see that the main source of noise during refrigerator operation is the compressor, the condenser and the fan motor that cools the compressor in the mechanical room.



(Fig. Diagram of Kimchi refrigerator noise source)

7-1-1. SVC method for noise claim

(1) Basic method of noise reduction

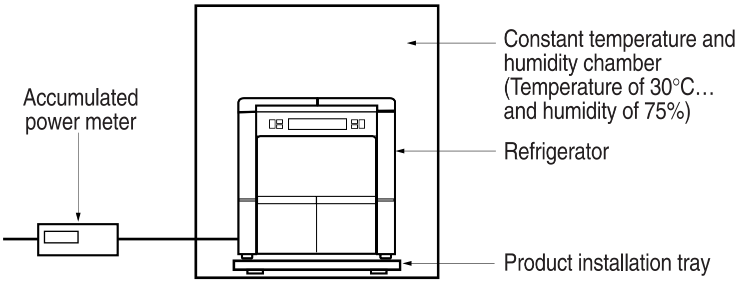
- **Block:** This method blocks the noise from the source so that it does not reach the ears by blocking the transmission path of the sound with high density sound blocker. (This is effective in high frequency area)
- **Using sound absorber:** This method is similar to the blocking method but uses Styrofoam and glass wool in the transmission path to absorb the sound. (This is effective in low frequency area)
- **Vibration reduction:** This method blocks the mechanical vibration from the operating part so that it does not reach other parts. (using vibration reduction rubber etc.)
- **Dynamic balance maintenance:** This method minimizes the dynamic imbalance of the rotating object.
- **Fixing the vibrating part:** This method firmly fixes the vibrating part depending on the situation.
- **Removing contact:** Separate the two parts or firmly fix the object that periodically make sound by hitting each other.

(2) Service method for major noise claim item for Kimchi refrigerator

Noise claim	Noise generation	Service method	Remarks
Noise from poor installation	▶ The installation floor surface is not hard enough ▶ The refrigerator is not leveled	• Reinforce the floor hardness • Move the installation location • Use the adjustment screw in front of the refrigerator to level the refrigerator	
Parts vibration	▶ “Wing” sound	• Insert firmly all the parts of the refrigerator in the right location	▶ Mainly within the refrigerating compartment
Compressor resonance sound	▶ “Woong Woong” sound	• Reduce the noise by adjusting the pipe and seat rubber	
Compressor noise	▶ Poor balance of the compressor ▶ Contacting sound of the surrounding pipe of the compressor part	• Adjust the surrounding pipe and seat rubber to maintain the level of the compressor • Remove contact	
Operating device noise	▶ Contact sound from the OLP contact point during compressor operation	• Exchange OLP	▶ “Tak Tak”
Wire condenser noise (vibration noise)	▶ “Woong Woong” sound ▶ “Ching” sound	• Recheck the screws • Remove the welding part of the heat plate (wire) and remove the heat plate	

7-2. Details on power consumption

The power consumption of the refrigerator is measured within the chamber where constant temperature and humidity is maintained. In the right figure, maintain the chamber to 30°C… and 75% humidity with no load to the refrigerator and set the temperature of the left and right compartment to 3°C… to measure the power consumption. The power consumption is calculated as follows.



Monthly power consumption (kWh/month) = Measured value (kWh/day) x 365 days / 12 months

Caution The actual power consumption and the one indicated on the refrigerator can differ due to the using condition.

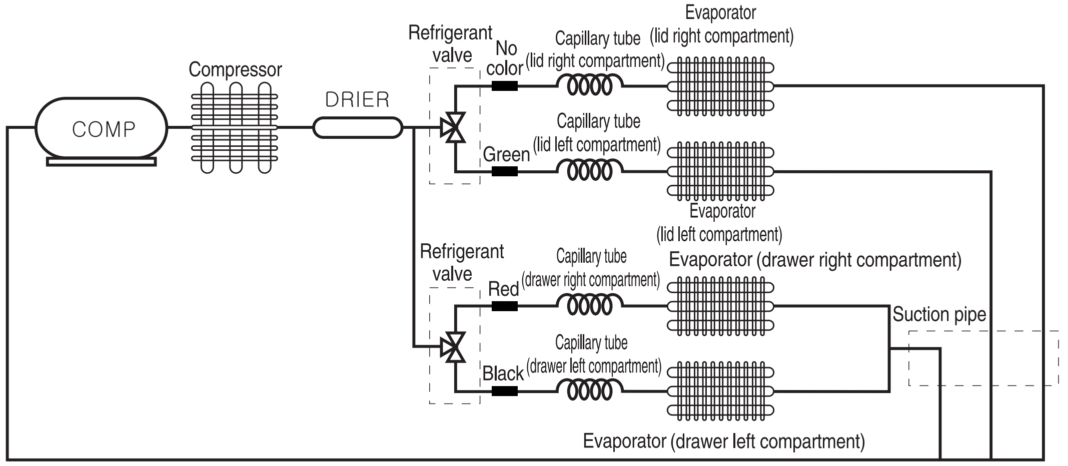
Characteristics of each part

8-1. Refrigerant valve

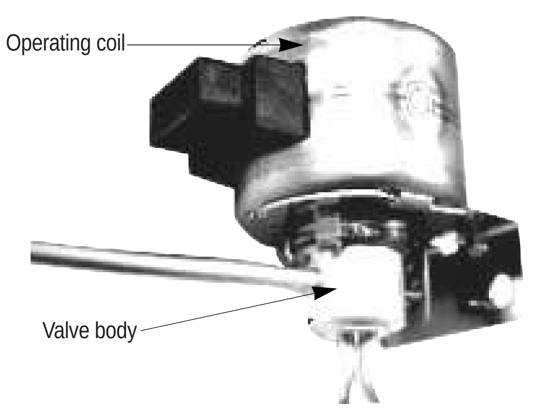
(1) Function

This switches the refrigerant that went through the compressor to the lid left/right or drawer left/right evaporator.

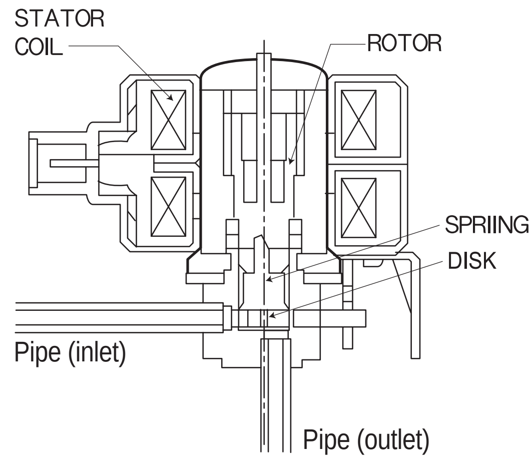
※ When connecting the 3-way valve and capillary tube, they must be welded by matching the same color as shown below. If not matched, it can cause a problem to the refrigerator.



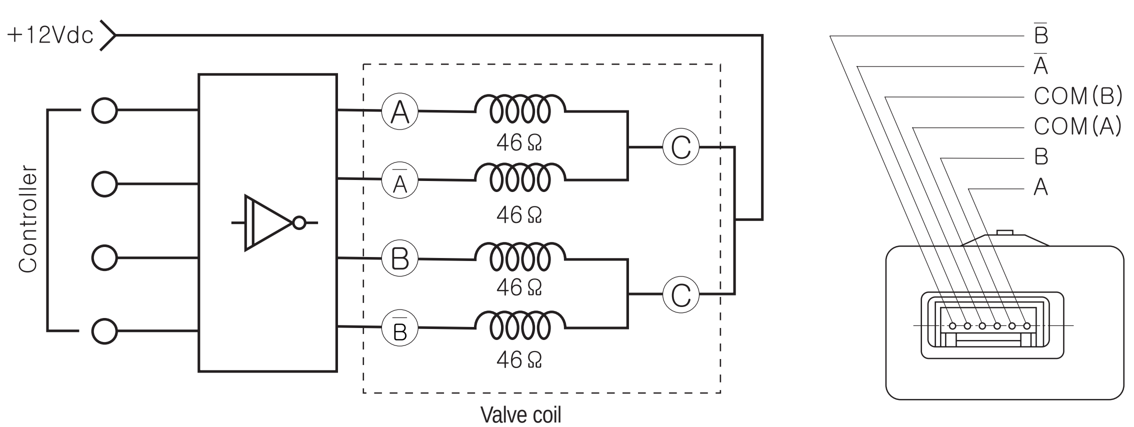
(2) Operating structure



(External structure)



(Internal structure)

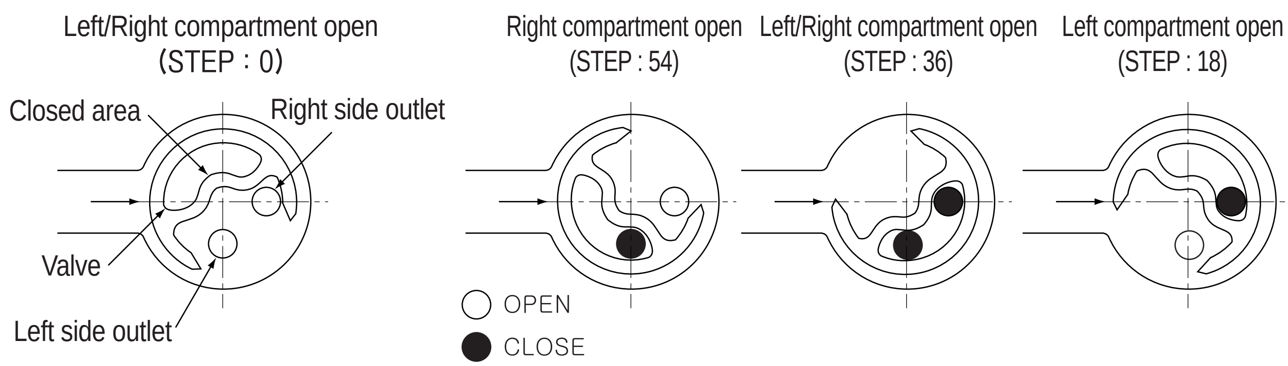


(Operating circuit)

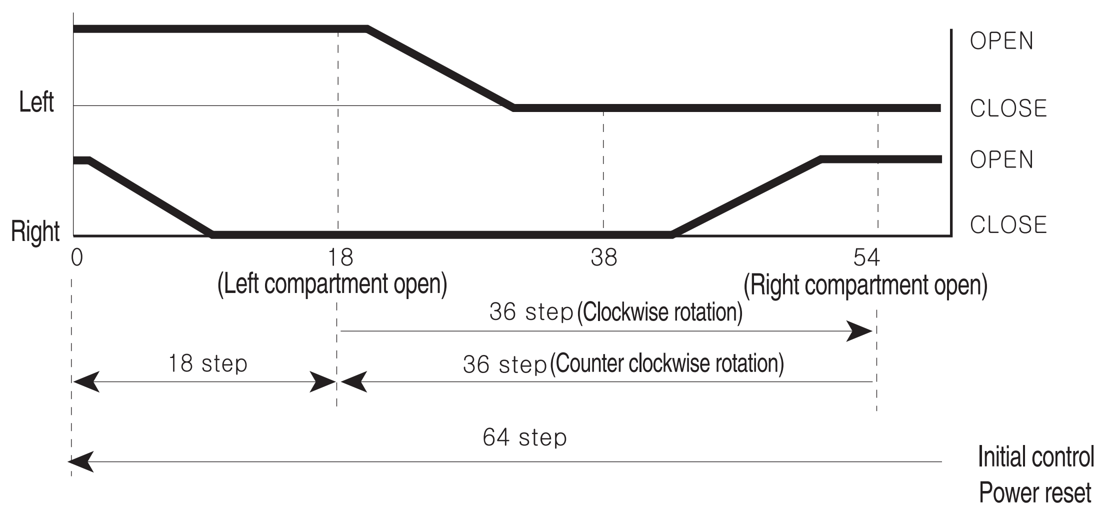
Characteristics of each part

(3) Operating principle

Controlling the rotating angle of the stepping motor will open/close the outlet pipe entrance by changing the shape of the valve connected to the bottom of the rotor.



(4) Operating characteristics



Characteristics of each part

8-2. Motor (mechanical room)

(1) Function

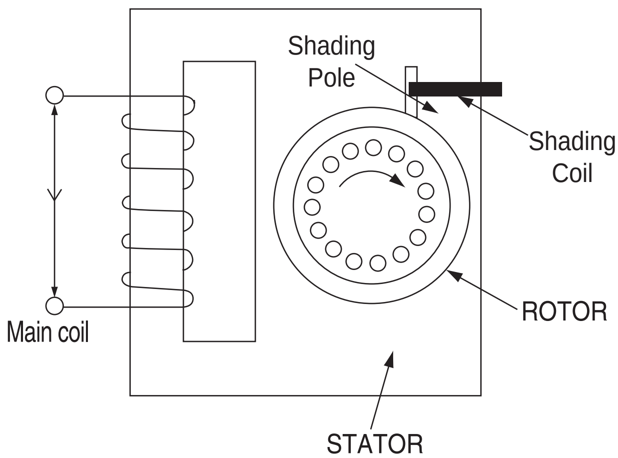
• Motor cooling (mechanical room)

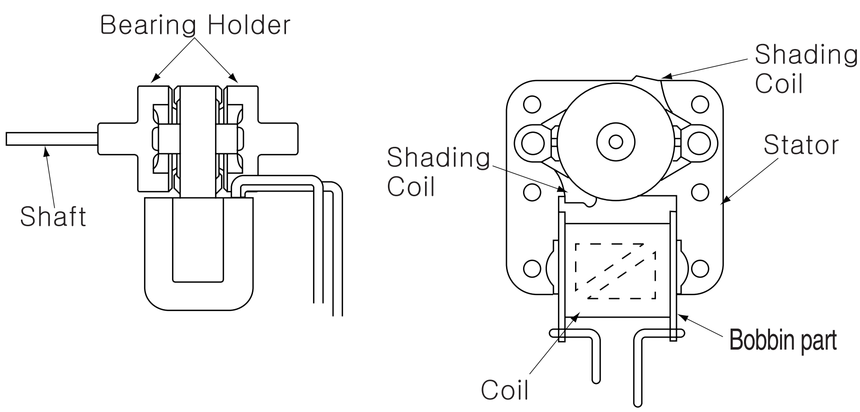
This is the part used for circulating the air within the mechanical room and applies to the wire condenser type. This operates when the compressor operates and the heated refrigerant from the compressor lowers the temperature when passing through the wire condenser and also reduces the temperature of the compressor to improve the performance.

(2) Operating principle and characteristic

• Characteristic

The motor applied to the refrigerator is the shading pole motor of the inductive motors. As shown below, it is a 2 pole device with one pole composed of 2 parts. On the small pole called the shading pole, wire is connected (shorted) called the shading coil. In accordance with the characteristics of the AC motor, the motor switches between + and - to operate but because in the 2 pole device, the N and S pole changes within both poles without left and right rotation, the device cannot rotate without help from an external device. Therefore the shading pole and coil creates the rotating direction for operation. The shading pole motor cannot rotate in reverse direction. Therefore the rotating direction must be set during assembly to rotate in the desired direction.





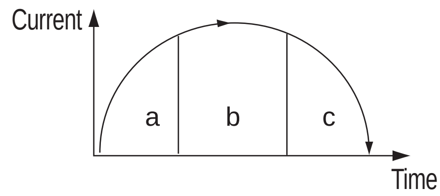
Characteristics of each part

• Operating principle

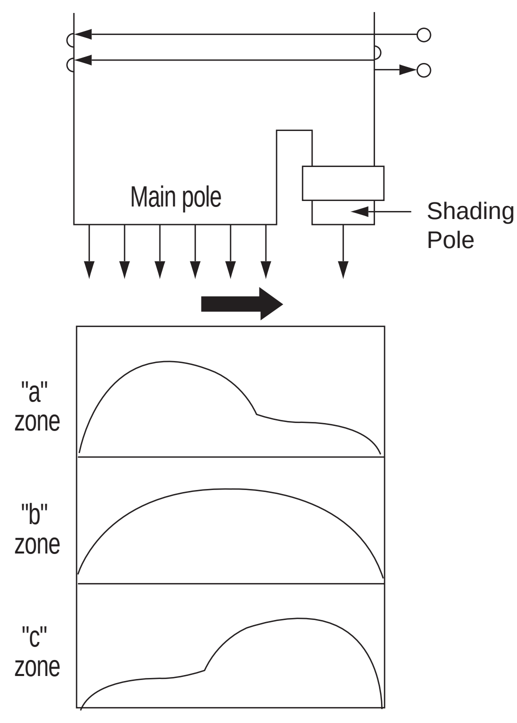
When the AD power is connected to the coil of the shading pole motor, the central axis of the magnetic field shifts in the bold arrow direction of <Fig. 2>. As the central axis moves, the rotor moves in the same direction to turn the motor.

Why does the central axis of the magnetic field shift?

<Fig. 1> shows a diagram of AC current changing as time changes. If you look at changes of magnetic velocity in “a” zone where the current abruptly increases, the velocity increases as the current increases in the main pole. But in the shading pole, the negative effect of the velocity increase is generated from the shading coil to reduce the velocity shifting the center of the magnetic field to the main pole. In “b” zone, the change in current is minimal and the negative effect of shading coil is minimal to have the center of the magnetic field in the middle as shown in <Fig. 2>. In “c” zone, the velocity of the main pole decreases but with the negative effect increasing the velocity from the shading pole side, the center shifts to the shading pole side. As shown, the center of the magnetic field shifts from the main pole to the shading pole to rotate the rotor.



<Fig. 1> Change of AC current



Removal of magnetic velocity on the pole surface

<Fig. 2> Change in magnetic velocity by changes in current

Characteristics of each part

8-3 Heater

(1) Introduction

When using the refrigerator, several heaters are applied to season the Kimchi or store the rice.

(2) Heater type and role

Classification	Applied part	Function	Resistance value	Remarks
Heater assembly	External surface of inner case (Lid-compartment)	For Kimchi seasoning	165Ω/EA	80W × 2EA
Heater assembly	Floor of inner case (Drawer-compartment)	For Kimchi seasoning / rice storage	1,653Ω/EA	8W × 2EA
Heater plate	Left side of inner case (Left drawer-compartment)	For Chungukjang seasoning	2,204Ω/EA	6W × 2EA

❊ The resistance value can differ by the model.

■ Heater assembly (ferment/rice storage)

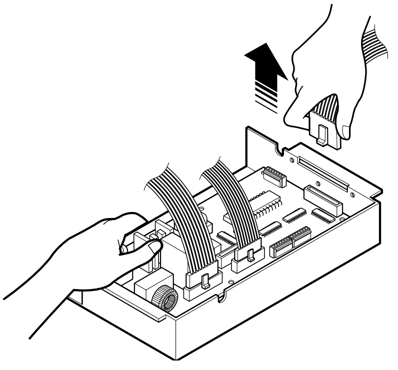
Problem (parts)	Symptom	Check method	Resolution
1. Heat wire disconnected/connecting wire disconnected	Kimchi not seasoned	1. Measure the resistance of both ends of the heater with a tester to see if it is →∞Ω.	1. Exchange the product
2. Poor terminal contact		2. Measure the resistance of both ends of the heater with a tester to see if it fluctuates.	2. Properly insert the connector

Cautions for disassembling the product

Chapter 9. Cautions for disassembling the product

1. Main PWB assembly

- When disassembling the main PWB assembly, located in the mechanical room, be careful so that the lead wires do not touch the edge part.
- If the lead wire coating is disconnected or the coating is damaged, it can cause a short circuit.

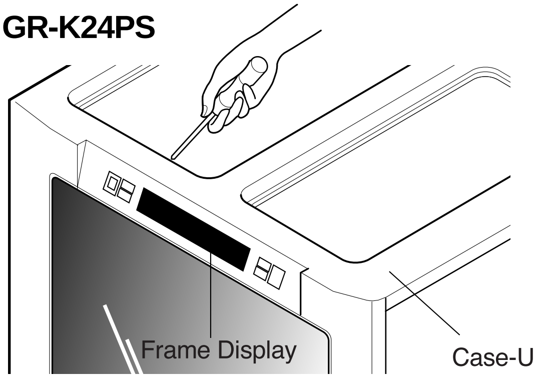


2. Frame assembly, display

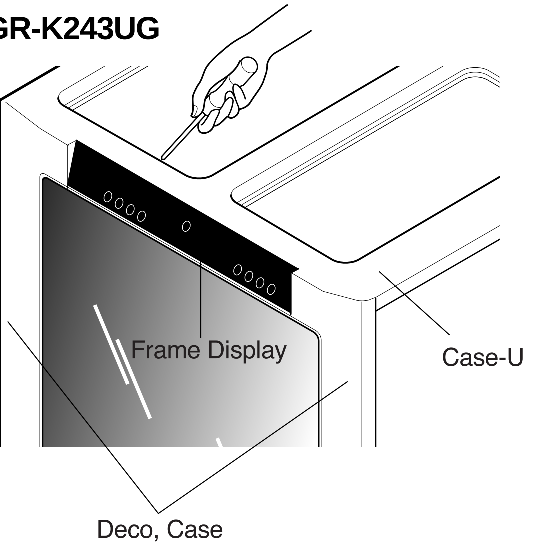
- Using the - driver, open the slot between the frame display and the case-U to disassemble the unit. At this time, be careful not to apply too much pressure to damage the PWB assembly, display or make scratches on frame display and case-U.

❈ Depending on the mode, the service slot is on the top left/right side or bottom left/right side.

GR-K24PS



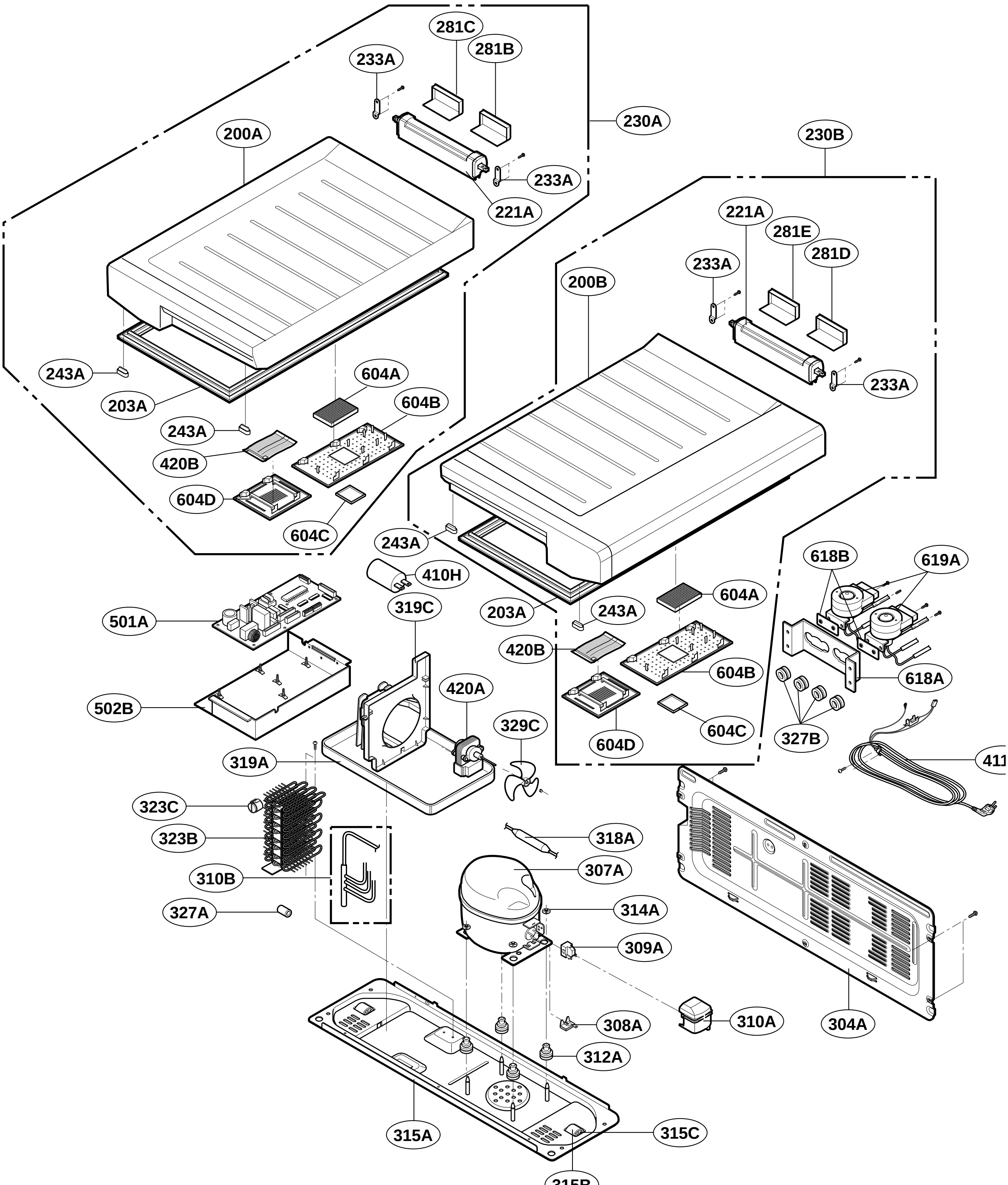
GR-K243UG



Assembly diagram and service parts list

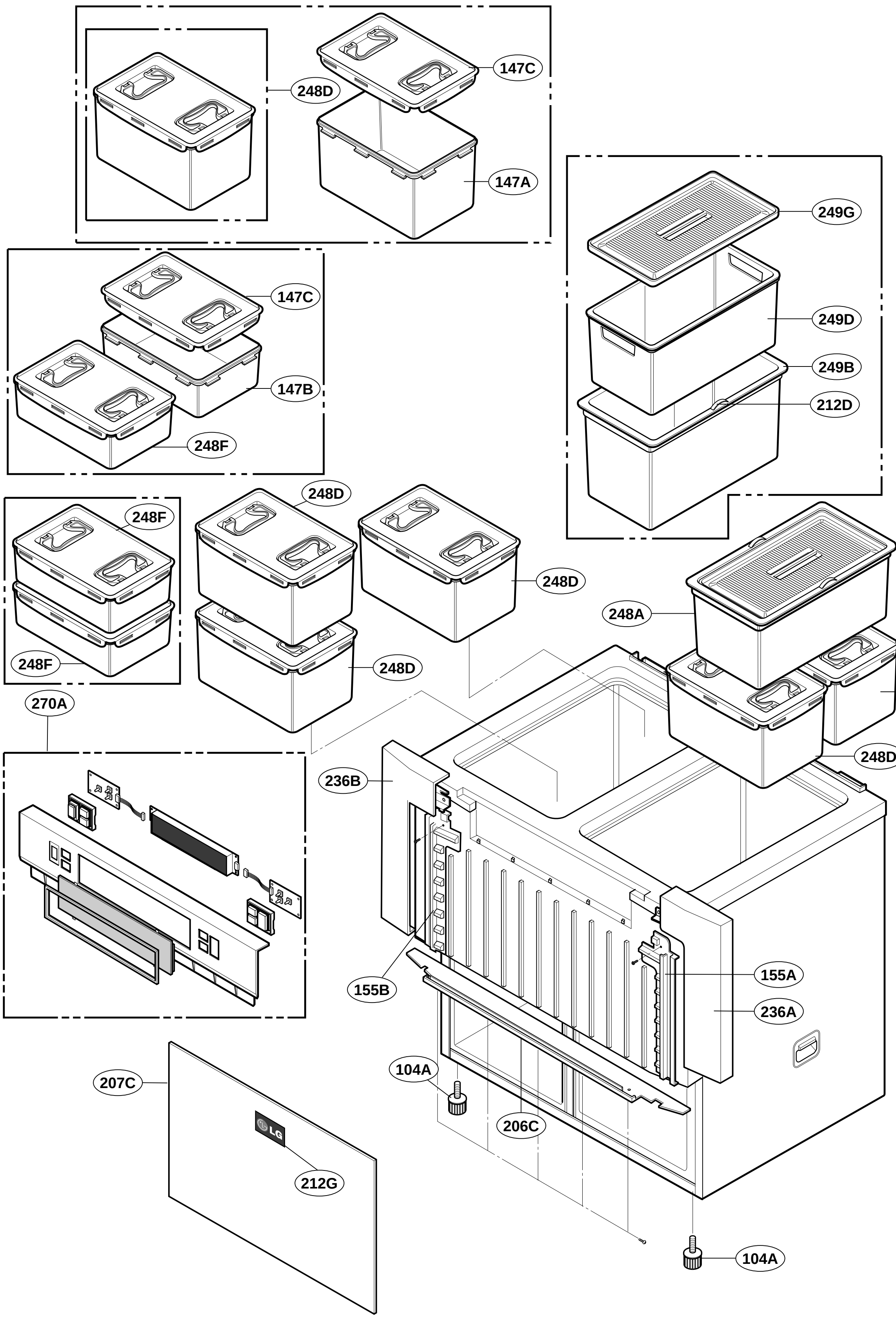
10-3. Assembly diagram

▶GR-K24PS



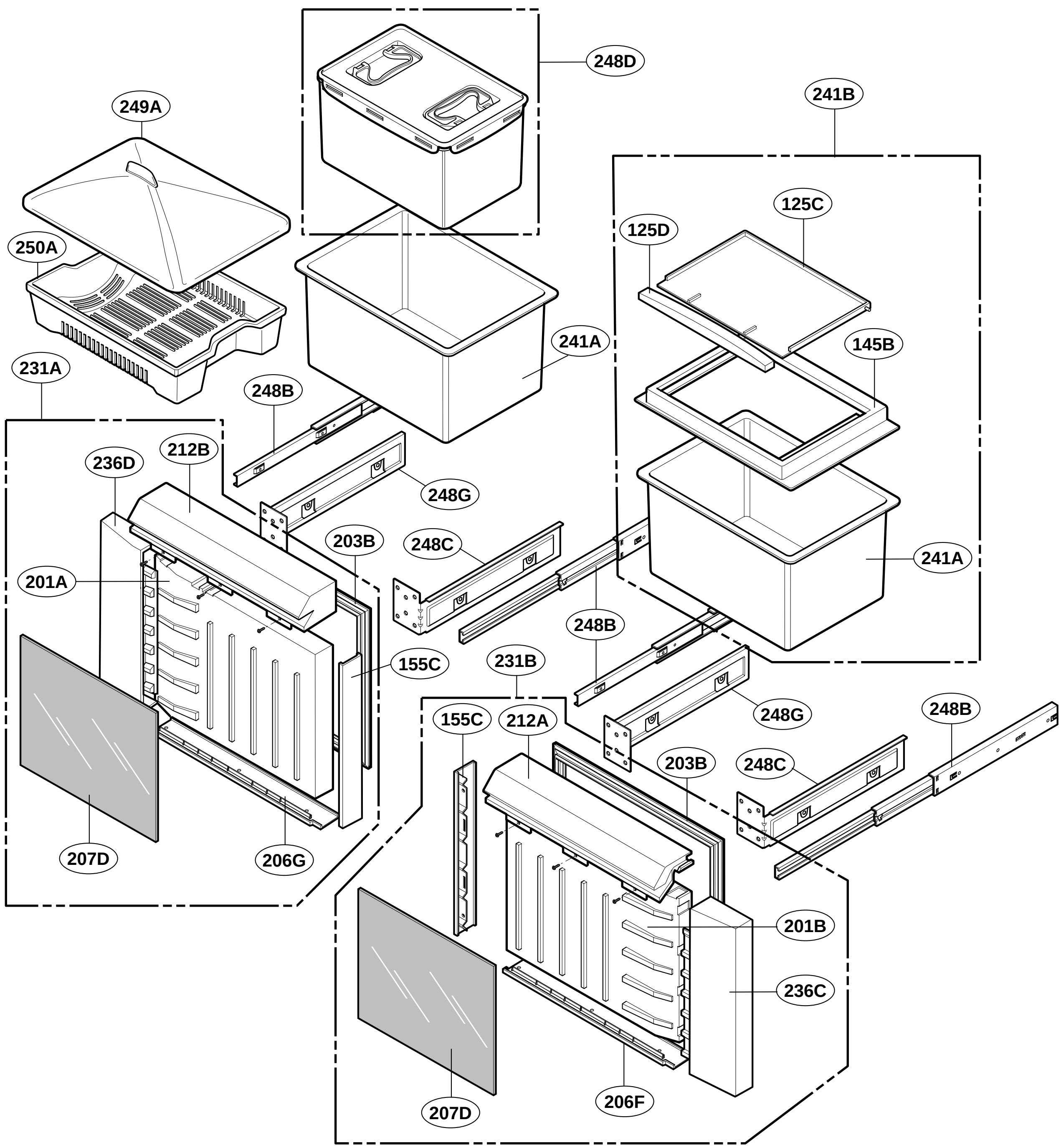
Assembly diagram and service parts list

▶ GR-K24PS



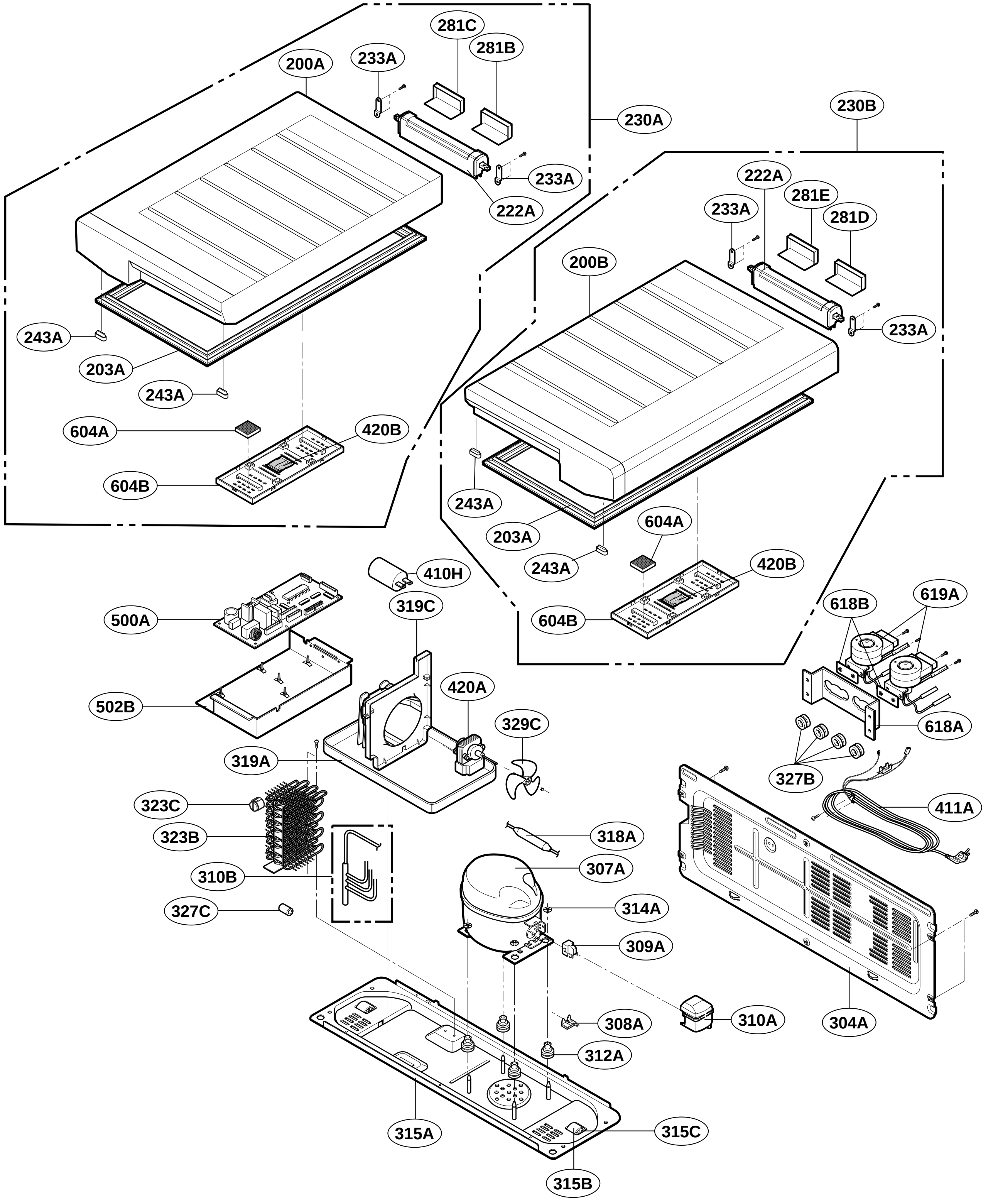
Assembly diagram and service parts list

▶ **GR-K24PS**



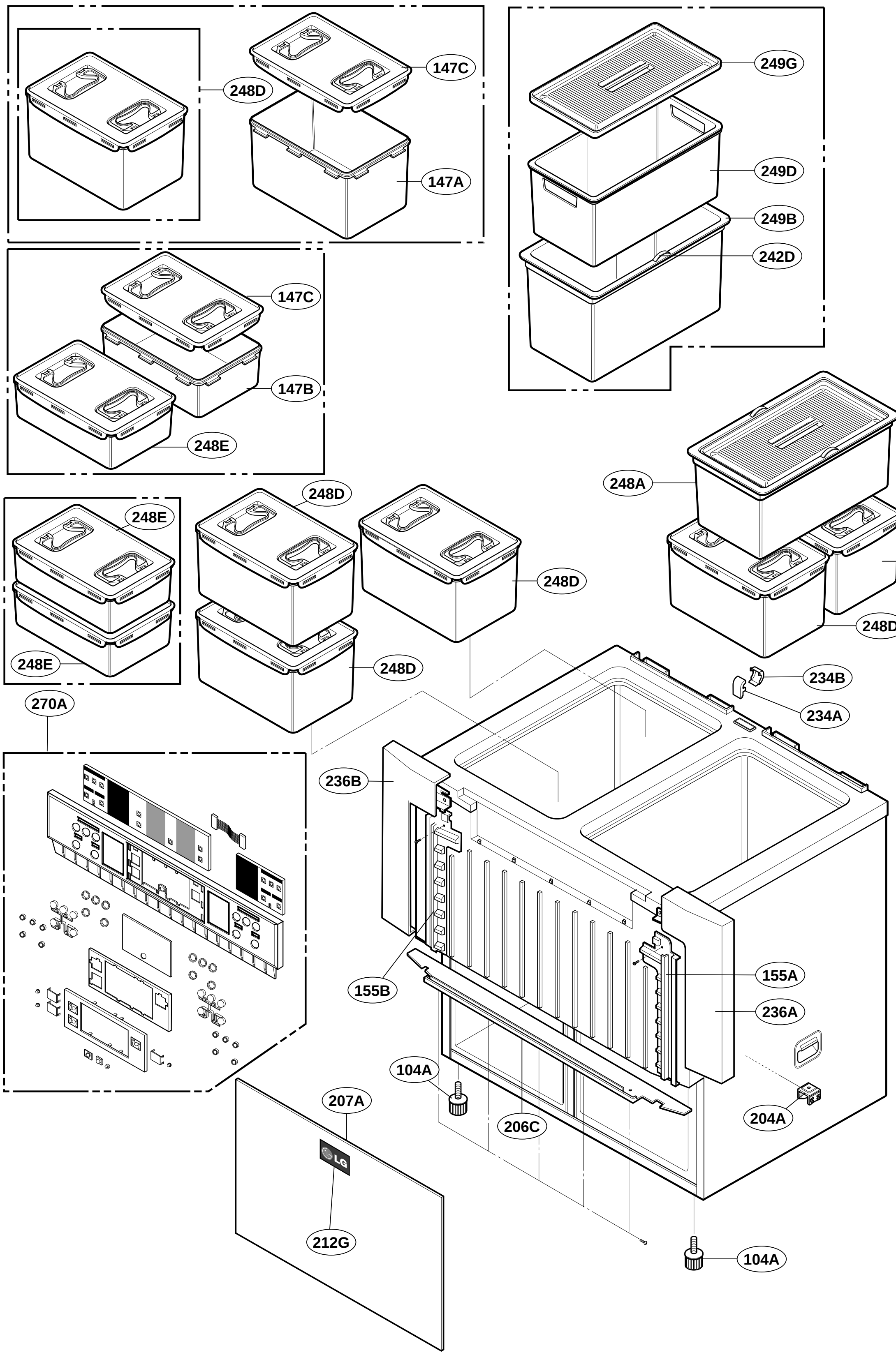
Assembly diagram and service parts list

▶GR-K243UG



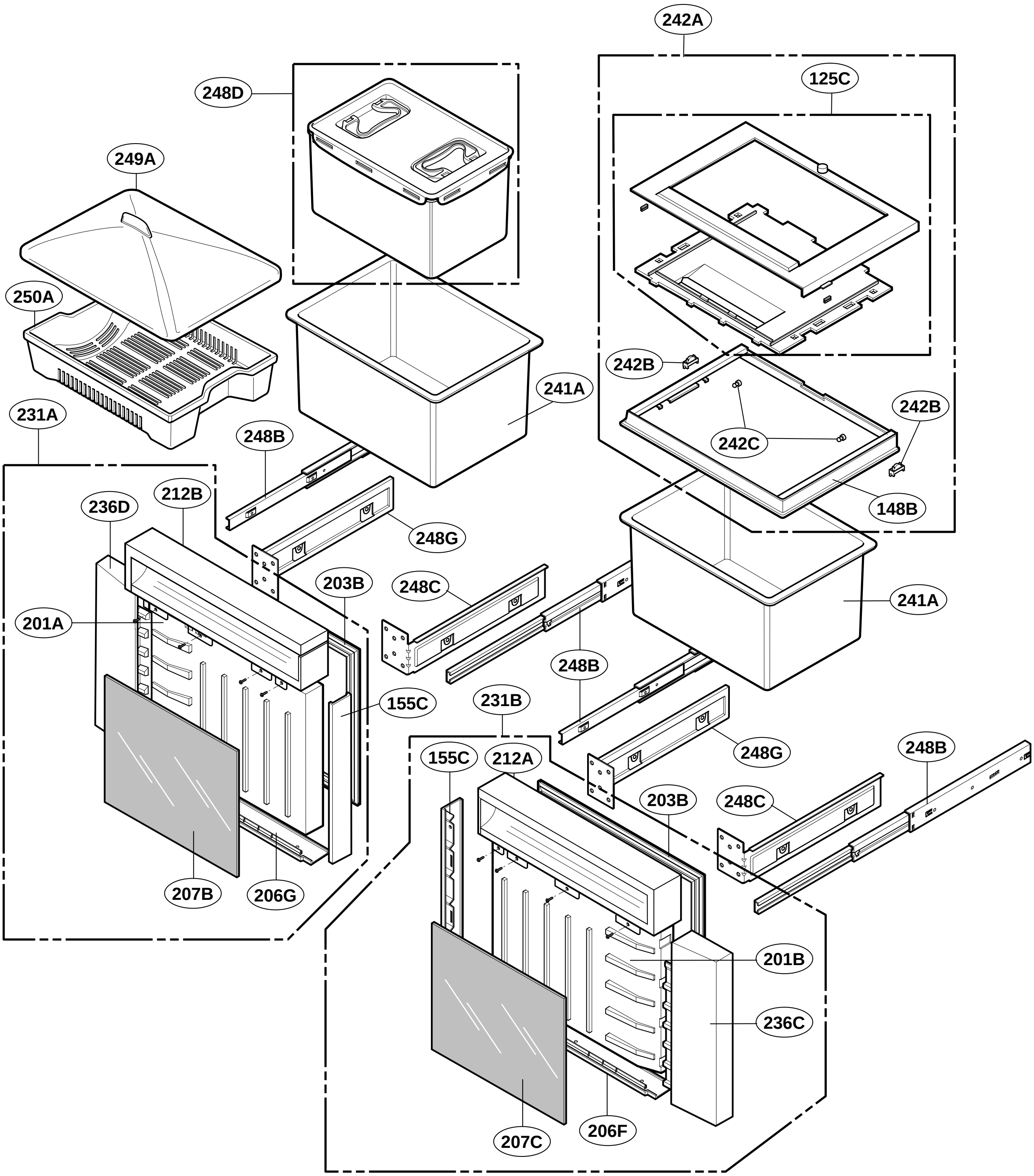
Assembly diagram and service parts list

▶ GR-K243UG



Assembly diagram and service parts list

▶ **GR-K243UG**



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